ELECTRICAL REVIEW

ILLUSTRATED.

A WEEKLY JOURNAL OF

Electric Light, Power, Telephone, Telegraph and Scientific Progress.

VOL. 21. No. 21. WEEKLY.

NEW YORK, SATURDAY, JANUARY 14, 1893.

$3 per Annum. Single Copies, 10 Cents.

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Entered at Post Office, New York, as Mail Matter of the Second Class.

VIEWS, NEWS AND INTERVIEWS.

While the moon and policemen may be full or not, according to circumstances, an arc lamp is always on duty and a guaranty against the performance of "deeds of darkness."—*William Taylor.*

Director General George R. Davis, of the World's Columbian Exposition, assures the public through the Chicago *News Record* that all arrangements for the opening of the World's Fair will be completed by May 1, and that the Fair will open on time.

J. W. Kelly, the humorist and funmaker, now playing at Tony Pastor's theatre, was a telegrapher 15 years ago. The Magnetic Club recognized this fact recently by sending a delegation of 60 members to encourage Mr. Kelly in his acts at Tony Pastor's.

The late Captain Albert Gallup, signal officer of the First Brigade, N. G. S. N. Y., prepared before his death a "Handbook of Military Signaling," which will be published by the Appletons in a few days. Although occupying but 75 pages, the book covers the ground thoroughly, going into certain details of its subject to an extent unusual in military books in this country, but, in the case of Captain Gallup's book, induced by a study of foreign manuals of signaling, to which the author makes acknowledgment.

A curious accident recently befell a trolley car at Seattle, Wash. The car which runs from Ballard to Seattle was standing on a switch, built out on the wharf over the bay. The piling of the wharf gave way and the car fell 20 feet, striking two piles which bored two holes in the floor of the car. The tide was out and the water was only four feet deep, consequently no one was drowned. If the accident had happened a few hours later, at high tide, the car would have fallen into 18 feet of water and all of the passengers would probably have been drowned.

Telegraph operators have a peculiar feeling for a fellow operator who gives instruction in the art or, as they term it, runs a "plug factory." They are looked upon as no less than traitors, men who, for a few miserable dollars, would sell what little knowledge they ever had of the profession. They are considered to be men who are unable to earn enough to live upon as telegraphers, and have few friends in the profession.

In a recent paper before the Institute of Patent Agents a case is mentioned of an inventor who, like most patentees, left the due filing of documents to the very last moment, but unfortunately went a little too far, and found the office closed, says London *Industries*. He could find no official with whom to leave the document; but he was not to be beaten. He therefore tied the papers to a brickbat, and threw the compound missile through the window. It was found next morning and duly enrolled. Under the present regulations there is a policemen in attendence, who will, we believe, take in such documents. At any rate he does not encourage the filing of documents through Her Majesty's office windows.

A gang of wiremen are at work installing an electric plant in the Kenmore Hotel, Albany. As the men work in and out of the different rooms stringing their heavy insulated wires under floors and behind wainscoting they are plied with innumerable queries by the guests, bell boys, chambermaids and other hotel employés. One of the girls, who had asked many questions, propounded the startling query of "What are you going to do with all that wire when you get through?"

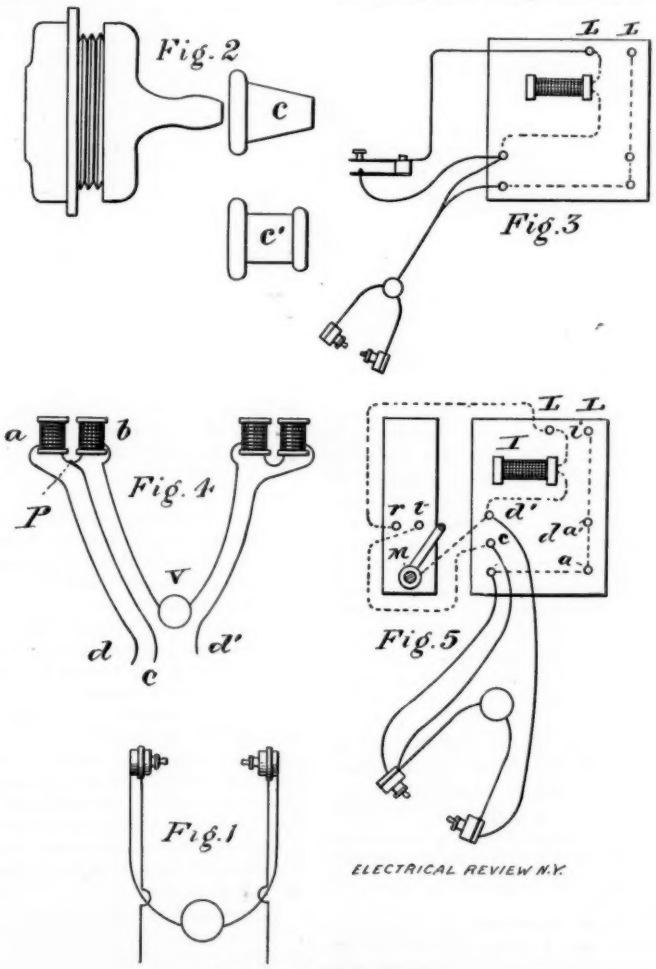
"Oh," said the unblushing and stolid-faced electrician, "when we get it all laid we pull the wires out and then the electricity runs through this covering, which we call insulation."

"Oh, I see," said the girl as she hastened away to tell of another triumph in the way of electrical research.

A story is told by a London exchange of a good lady of Slaithwaite who, on a visit to Huddersfield, asked the foreman of the electrical gang at work in the streets the way the "leet" was made. The foreman replied that electricity was generated by currents. The woman, thinking that "currants" was the word used, straightway went and purchased two pounds of that toothsome commodity. When she found that the electric light could not be made out of the dried fruit she had purchased, she consoled her somewhat ruffled feelings by remarking that "If it ain't bahnd to mak' t' leet, it'll coom in for makkin' t' Kersmas puddin'."

Mercadier's Bitelephone.

In a recent number of the *Journal Universal d'Electricité* J. Anizeau describes and explains certain new features embodied in Mercadier's bitelephone, which are worthy of general knowledge. It will be remembered that in October, 1891, Mercadier gave a description of his bitelephone in a communication addressed to the French Academy. The most prominent feature of this instrument is its direct applicability to the ear, because it is of such lightness and size that it may be inserted within the orifice, and thus the hands of the speaker or listener are not required to support the instrument.



MERCADIER'S BITELEPHONE.

Of course, long prior to Mercadier's bitelephone, numerous attempts had been made to solve the problem of relieving the hands from holding the instrument to the ear, and several thousands of so-called head telephones are at present in use in every central station. But the general use of such head-supported telephones is impracticable, for the distance from ear to ear not being the same for any two persons, such contrivances must be carefully adjusted for each individual to be of service. In short, the inventor of a really useful self-supporting telephone must consider two important points:

(*Continued on next page.*)

LIGHT AND POWER STATIONS.

SOME HINTS TO OWNERS AND OPERATORS BY A PRACTICAL ENGINEER.

Design And Location of The Switchboard And Wire Tower—A Matter Of Great Importance—Fire-proof Construction—Factors To Be Considered—The Best Is None Too Good.

BY ROBB MACKIE.

XII.

To those unfamiliar with central station work, the design and location of the switchboard and wire tower are generally considered as matters of unimportant detail, which can be attended to after the buildings are completed and the machinery nearly all ready to start up, while many old hands in the business, who should know better, never consider these points until the last, and then patch up any kind of a board and run the wires out through almost any kind of a hole in the wall or roof, trusting to good fortune that all will move along without trouble. As a matter of fact, the switchboard and wire tower are essential features of the design of the station, and should be considered among the earlier points that are taken up.

Numbers of fires, some of them having entirely destroyed the stations and many having seriously crippled the plants for days, have resulted from careless design and slovenly construction of these factors in the make-up of the station. The causes of these disasters have been appreciated by electrical engineers, who have substituted fire-proof construction for the old structures of "thoroughly dry and well shellaced wood," which have been found to possess, in addition to the high insulation, a very high coefficient of inflammability; this latter feature was overlooked until bitter and sad experience, that hardest of task-masters, showed the necessity for more durable construction.

The development of the switchboard and wire tower from the earlier forms of two or three crude switches fastened to a wall or on a board for the one, and a board pierced with a few holes placed in a window for the other, to the present magnificent structures with iron or steel frames and slate or marble fronts, and the capacious wire tower for overhead, and cable vaults for underground, construction, is a subject well worth the careful study and investigation of the uninitiated before allowing any crude or home-made designs to be adopted, which will, in all probability, result in constant trouble and loss, and eventually have to be replaced by a properly constructed board or tower at a heavy expense.

This is a matter of as great importance in the smaller as in the larger stations; for, while the danger is increased in an incalculable ratio as the number of circuits and classes of service increase, the danger is an ever present quantity and cannot be guarded against with too great care, for it must be remembered that the entire power of the station converted into electrical energy, in

many cases of very high potential, is carried over this switchboard and out through this tower, forming, as it were, a narrow channel through which all this energy has to pass before being distributed in various directions throughout the entire city. Back also through this same narrow channel must come the lightning discharges which are always so difficult to provide for, and which have left numerous cases on record where the entire switchboard has been burned up as a direct result of a "crossing" of circuits over the board, owing to a discharge coming in on two circuits simultaneously.

It behooves the investor to have this subject carefully considered in order to avoid one of the worst shoals upon which their less fortunate predecessors have so nearly or altogether gone to pieces in the earlier days of this industry.

The designs for switchboards and wire towers are numerous, and among them are many that are especially adapted to the work; but it must be remembered by the uninitiated that one that is appropriate for one class of work is totally inadequate for another, and therefore, in selecting a board care must be taken to get the one best suited to the work, and for this reason it is essential to have this part of the station designed by one who is thoroughly familiar with the causes of failure in the past, and conversant with the improvements of to-day.

Fireproof construction is one of the best safeguards to be adopted; for, with board and tower of this character, the danger of the partial or total destruction of the board or station is greatly reduced, and it must be kept in mind that the oil soaked floors and timbers are quickly ignited, and a fire once started rapidly gains headway, and therefore, every precaution should be introduced that tends to cut off or check the spread of fire.

It appears essential, therefore, that these two factors should be carefully considered at the outset, and due consideration given to the location of both with reference to the positions of the generators on the one hand and the direction in which the circuits are to leave the tower on the other. In the smaller stations the switchboard should be so located that attendants can conveniently handle both the dynamos and the board, and be able to watch one from the other. There are many advantages in this, best appreciated by those who have actually handled dynamos in station work. The wire tower should be roomy, strong and arranged so as to get at the wires easily. The wires should bear the same relation to one another from the pole line through to the switchboard. This can usually be done by the exercise of a little forethought. Some very absurd mistakes have been made in the location of wire towers with relation to the direction in which the circuits leave the station; in some of them the greater part of the outlets are on the side away from the direction in which the circuits are to run. The result is an almost interminable tangle of the circuits from poles to the switchboard, and all kinds of "fake" contrivances to get the wires around the tower itself.

These two elements should, therefore, be very carefully considered in designing the station, and due weight given to the necessary requirements in order that the whole may be well balanced, not only from the standpoint of the engineer, but from that of the pocket book of the investor.

In touching upon this final element of the station proper, and before taking up the subject of line construction, it is well to call attention to the advisability, especially in the small stations, of keeping to adopted standards and not to be filling the station up with different makes of machines for the same class of work. Whenever it is necessary to add new machinery to a plant, and the dynamos in use are in good condition and have given satisfaction, stick to the type and make increase with the same type of dynamo. It will be found far more satisfactory and economical in the end than will the mixing of various makes of machines for the same service in a station. On the other hand, if an increase is to be made and the machinery has not been satisfactory, it is far better to change it all even at an increased outlay, for there is no one factor that will so rapidly eat into the profits of a station as the bad service due to faulty or defective machinery.

Stations should be equipped with the very best machinery to be purchased, maintained in the very best condition, and the greatest care exercised to give a steady, reliable service, and then the profits will begin to come to the pockets of the investor.

(To be continued.)

Electrification of the Steam Jet.

At a recent meeting of the Royal Society Mr. John Aitken read a paper "On some Phenomena connected with Cloudy Condensation," which contains the results of some very interesting observations made by him. It was shown that the mere presence of an electrified body in the vicinity has no influence on the steam jet. In order to produce the increased density the water particles in the jet must be electrified, either by direct discharge, or by an inductive discharge, effected by means of either a point or a flame. The increased density produced by electrification is due to an increase in the number of water particles in the jet, by the electrification preventing the small drops from coming into contact, by the mutual repulsion it produces, in the same manner as the water drops in Lord Rayleigh's experiments with water jets, which scatter more when electrified than when not electrified. The coalescence of the drops in water jets takes place only under the disturbance produced by the presence of an electrified body, while such a disturbance produces no effect on steam jets. Other experiments point to the conclusion that the increase in the density is due to an increase in the number, and not to an increase in the size, of the drops. For instance, if steam is blown into a receiver full of air in which there are many dusty particles to serve as nuclei of condensation, the clouding is dense; and if there are few nuclei the clouding is not dense. The same statement holds good for the clouding produced by expanding moist air. If many dust particles be present, the clouding is dense; if few it is not dense. The explanation of the effect of electrification seems to be, that since the particles in the jet are in rapid motion there are frequent collisions among them under ordinary circumstances, and a consequent coalescence of the small drops into larger ones; whereas, when the small drops are electrified they repel one another, and coalescence is in some degree prevented. The jet, upon becoming dense, emits a peculiar sound, which is the same whatever be the cause of the increased density. But when it is electrified, along with this sound there is another, due to the discharge of the electricity, which causes the electrified jets to appear to make a louder noise.

Fire in One of the Factories of the Fort Wayne Electric Company.

Tuesday afternoon last a fire broke out in one of the large factories of the Fort Wayne Electric Company, at Fort Wayne, Ind., and the loss caused by fire and water amounted to some $200,000, fully covered by insurance.

Mr. R. T. McDonald, the head of the company, was in New York at the time, and opened communication by means of the Western Union Telegraph Company, at Twenty-third street, with his own operator in his Fort Wayne factory. While the fire was raging in the factory, Mr. McDonald was talking to his telegraph operator in the office part of the building, continuing the communication until the fire was extinguished, with the loss above stated. Fortunately, the large storeroom which was packed with valuable apparatus for shipment escaped damage, and while the loss was quite large, the resources of the Fort Wayne Company are so extensive that the fire will not materially interfere with the filling of orders.

Mr. McDonald returned home the next day and at once proceeded with the work of rebuilding.

Mercadier's Bitelephone.

(Continued from first page.)

1. The instrument should be very light.
2. Whatever means are employed to hold the telephone must be effected without fatiguing the user.

After a long and careful study of the problem, Mercadier developed his bitelephone, the first public description of which appeared in the *Comptes Rendus*, in 1885.

It will also be remembered that Mercadier has demonstrated that the loudness of telephonic reproduction depends partly upon the diameter and thickness of the diaphragm, partly upon the strength of the magnetic field. When the first two factors remain undisturbed, it is easy to find the maximum effect for the third, and again this maximum effect varies with each change in the other two conditions.

It has been assumed by many telephone inventors that the intensity of sound decreases with the gradual reduction of the size of the diaphragm. The bitelephone proves the fallacy of such an assumption. Its weight is but 50 instead of 400 grammes, that of the ordinary telephone. Its clearness of articulation, which is surprising, is produced by employing a diaphragm whose fundamental is below the mean pitch of the human voice. Thus the fundamental as well as the harmonics of the diaphragm are avoided. This is a great advantage, for both the fundamental as well as the harmonics affect the clear reproduction of the voice by superimposing their vibrations upon the individual excursions of the molecules which are required to effect the transformation of energy. Mercadier has pointed out the way for much future improvement in the construction of telephones. His work well illustrates the futility of all attempts to improve the telephone by merely increasing the strength of the magnetic field. On the contrary, experience teaches that a weak magnetic field is desirable for receiving telephonic sounds over long distance circuits.

The second part of the problem, *i. e.*, the method of supporting the instrument without the use of the hands, is shown in Fig. 1, which is self-explanatory.

Is it a practical form of telephone? In reply, it may be stated that the operators of the central station in the Avenue Wagram, Paris, have used it for a year and express their entire satisfaction. At first the rubber tube or end piece, *e*, shown in Fig. 2, was used with the bitelephone, but experience led to the adoption of a second form e^1, which is equally advantageous for men and women. Without entering into the numerous experimental tests which resulted in the adoption of e^1, it may be said that it is the most satisfactory and most effective form for various technical reasons.

Figs. 4 and 5 are added to show some of the advantages accruing from the use of the bitelephone. It will be seen (Fig. 4) that a connecting cord is attached to the center of the two electro-magnet coils *a* and *b*; again, as shown in detail in Fig. 5, a two-way switch, *M*, is added, by means of which the induction coil may be instantly cut out of the circuit. Again, by placing *M* upon *t* (when it is desired to transmit), the secondary helix of the induction coil, as well as one-quarter of the bitelephone circuit, are included in the line.

The presence of such apparatus at both ends of a long distance circuit considerably increases the volume and distinctness of the transmitted sounds. For a description of the experiments which prove the correctness of this statement, the reader is referred to the article which appeared in *La Lumière Electrique*, June 6, 1891. But, as not every subscriber is an expert telephonist, it is suggested that the arrangement illustrated by Fig. 3 would be preferable.

The citizens of North Fairmount, a suburb of Cincinnati, celebrated, on January 2, the opening of seven miles of trolley road which connects them with the city. The new line is an extension of the Cincinnati Consolidated Street Railway Company's system.

WORLD'S FAIR NEWS.

Director-General Davis has nominated Dr. J. A. Hornsby for Assistant Chief of the Department of Electricity.

The meeting of the Board of Control, which was announced for January 5, has been postponed until January 10, owing to business engagements of several of its members.

The location of the educational exhibit has been definitely settled; it will be in the South Gallery of the Manufactures and Liberal Arts Building; the space assigned to it is 175,000 feet gross.

Jackson Park is now one vast warehouse towards which every railroad and steamship in the world is bringing exhibits for the World's Fair. It is expected that March 1 will find a large portion of the exhibits in Chicago, excepting those intended for the Horticultural Department.

John Boyd Thacher, chairman of committee on awards, is in Chicago consulting with the World's Fair officials; he says that the rules governing the awards will be made public in a few days. It has been decided to have only one judge in each case where an award is to be made, instead of leaving it to a jury of six, as is usually done at expositions.

Foreign nations have been the earliest on the grounds. The early arrival of exhibits from abroad may be so counted for on the theory that most of the foreign commissioners are experts in Exposition matters. Domestic exhibits, on the other hand, have been delayed on account of the time that it has taken to make the allotments. The fact should be impressed upon domestic exhibitors that the advantage of being represented early on the grounds cannot be overestimated; this can be done without the personal attendance of the exhibitor, and the saving of a journey to Chicago, through the "International Exhibitors' Association," of the Stewart building, New York, which is fully prepared to care for the exhibits and interests of Eastern and foreign exhibitors based on a co-operative plan.

At a recent meeting of the executive committee of the "International Exhibitors' Association," New York, the following resolution was passed: "Moved and seconded that the secretary be requested to obtain letters of authority from such members of the Association and intending exhibitors who may desire to have Messrs. Cochran & Hollaman see the officials of the Fair in their behalf, in regard to their obtaining an immediate notification of their allotment of space at the Fair, while on their intended trip to Chicago." A letter embodying this resolution has been forwarded to a number of intending exhibitors, and if they will communicate immediately with the secretary of the Association, in the Stewart building, New York, and send a letter of authority, as stated in the resolution, the committee will be very glad to give personal attention to same, while on their visit to Chicago.

Chicago, January 5.

Indecorous Quaker City Cats.

[From the Philadelphia *Record*.]

The trolley line along Bainbridge and Catharine streets is responsible for a new race of cats, which is being reared in the neighborhood through which the electric line passes. They are large, fat and frisky, and can only be compared to other cats as a full grown Newfoundland dog can be compared to a waddling pup.

This great physical vigor and wonderful development is due to a course of electrical treatment to which they subject themselves. Every night when the travel along those streets has subsided, the cats can be seen coming out for their treatment. There is just enough electricity in the rail to answer their purpose, and first they lick the rail fondly. Then they roll on the rail and wallow in the electrical fluid and act in every way as if they were under the influence of a catnip dissipation. After a few minutes of this, they get up and dance around like puppets on a string. These exhibitions are of nightly occurrence, and the windows of the thoroughfares are crowded with eager spectators.

ELECTRIC RAILWAY AND POWER NOTES.

An electric railway from Doylestown to Perkasie, Pa., is being agitated.

The Rochester, N. Y., Railway Company is about to increase its motive power.

A movement is on foot for an electric railway between New Bedford and Fall River, Mass.

Atlantic City, N. J., street cars bear signs informing the public that they are heated by electricity.

Several weeks ago Henry Villard disposed of his Milwaukee electric railway holdings to a syndicate.

The formal opening of the Hornellsville and Canisteo, Pa., Electric Railway occurred on December 29.

The Newark, N. J., Board of Public Works has passed a trolley ordinance over Mayor Haynes' veto.

The Liverpool, England, overhead railway is to be opened by the Marquis of Salisbury on February 4.

Electric stamp cancelling machines have been installed at the Dubuque, Ia., and New Haven, Conn., post offices.

A combination has been formed to run an electric railway between Pittsburgh and Elizabeth, Pa., a distance of 35 miles, along the Monongahela River.

The New York State Railroad Commissioners have approved the application of the Olean Street Railroad Company for permission to change its motive power from horses to electricity.

Plans are being considered at Indiana, Pa., for the building of an electric railroad from Indiana to Punxsutawney, a distance of 28 miles. A company with $150,000 capital is being formed.

The city council of Trinidad, Colo., revoked the franchise of the street railway company on December 28. Trinidad, therefore, now offers a splendid opportunity for the investment of capital in an electric railway.

The West End Street Railway Company is to petition the legislature for authority to tunnel under Boston Common. The company already has the right to tunnel anywhere in the city except under the Common.

The Flynt Building and Construction Company, of Palmer, Mass., has the contract to build a machine shop, power house and forming shop for the Union Electric Company, of Orangeburg, N. Y., to cost about $32,000.

The deal which has so long been pending at Rome, Ga., and which has been so much talked about, has at last been closed for the North and South street car line, and that line is now the property of the Rome Electric Railway Company.

The grading of the new electric road between McKeesport and Wilmerding, Pa., will be commenced as soon the weather will permit, and the road will probably be completed by May 1. Freight and probably mail and express matter will be carried.

About $40,000 of the capital stock has been subscribed for an electric railroad between Saxton's River and Bellows Falls, Vt. It will be built of standard gauge and will be connected with the main lines so that freight or passenger cars can be coupled on and drawn by motors.

The court has appointed Messrs. Samuel C. Slaymaker, H. C. Demuth, H. B. Parry, John D. Skiles and John R. Bitner as viewers to assess damages due to the Lancaster and Susquehanna Turnpike Road Company by the Lancaster and Columbia, Pa., Electric Railway Company.

It is stated that Dr. Challiss has been offered $30,000 in cash for his Atchison, Kas., street railway franchise, and he be allowed to keep his cars and stock. Dr. Challiss, it is alleged, wants $30,000 in preferred stock in the new electric company, in addition to the $30,000 in cash.

It appears that the project for constructing a boulevard between Baltimore and Washington, and fitting out the same with an electric railway, is beginning to take shape. At all events, those interested in the scheme are holding frequent consultations, and numerous rumors are in the air to the effect that work is about to begin in grading the roadway and laying the track.

Those who are familiar with inside operations in the railroad line state that the Old Colony Company will leave no stone unturned to discourage the building of an electric road between Fall River and Taunton, Mass., and many are of the opinion that should the promoters of such a road furnish evidences of their intention to construct it, they would not have to look far for purchasers to take it off their hands.

The introduction of electric street car lines in the East is causing a great decrease in the demand for horses in the West. Bert Cirtwell, of Atchison County, who formerly shipped a car load of horses East every month for use on the street car lines, does not now ship a car load in six months. The horse car line is fast becoming a thing of the past in the East, and the market for "plug" horses in this part of the country is ruined.—*Atchison, Kas., Globe.*

George Sprague, of Albion, N. Y., owner of the principal water power at Waterport, has made an offer to the town officials of Carlton, to build the abutments of the proposed new bridge, 30 feet high, of solid masonry, the town in return to give him the privilege to use the abuttments as the ends of a dam 20 feet high. The power obtained would be used to furnish the village of Albion and the intermediate villages of Gaines and Eagle Harbor, as well as Waterport, with electric power for operating a number of factories and mills.

The Lynn and Boston Railroad is now running electric cars from the Lynn city hall to Scollay square, Boston, in one hour and 15 minutes, and very soon it is expected to reduce the running time to one hour. One hour by electric cars from Lynn city hall to Scolley square is about the same time now consumed in the steam car trip by persons living adjacent to the main line of the Lynn and Boston road in Lynn, with the saving of a street car fare on each end. With electrical details perfected Superintendent Foster thinks that in a year or two the electric cars will run into Boston from Lynn in 45 or 50 minutes.

Secretary William B. Rankine, of the Cataract Construction Company, says that in all probability the foundations for the turbines to be placed in the wheel pits at the Niagara Falls power plant will be ready for the wheels by April 1, and that the power will be generated by May 15 or June 1. He also says that when the power is ready for use the local applicants will be supplied first and Buffalonians will come in for the next consideration. But that will not make much difference to anyone, as after the first power is generated at the tunnel it will be only a matter of a few days before more turbines can be put in the pit and operated, so that no one need fear that there will be any delay in getting the power to Buffalo when once a turbine wheel is in operation.

No stronger proof of the great benefits of the new trolley line in Philadelphia could be given than that afforded in the common council of Philadelphia the other day, when Mr. Irvine, of the Thirtieth ward, presented an extensively signed petition from the residents of his ward asking council to grant permission to the Traction Company to erect a similar system on Gray's Ferry avenue, from the bridge to South street. In presenting the petition, Mr. Irvine stated that among the signers were many of the people who had previously signed a protest against the introduction of the trolley, but that since they had seen the practical working of the system on Catharine and Bainbridge streets, they had been fully converted and were now anxious to have the improvement generally introduced.

The Police Telegraph System of the City of Brooklyn.

SUPERINTENDENT F. C. MASON.

Superintendent F. C. Mason, in charge of the Telegraph Bureau of the Department of Police and Excise, Brooklyn, N. Y., presents a very complete and interesting report of the annual work of his bureau. The total number of messages sent and received for the year ending December 31, 1891, was 187,688. The record of arrest book, giving full information of all arrests made by the members of the force in each and every precinct, is written up by this bureau, and a quarterly report of the number of arrests made furnished the superintendent, and is no small item of the work done.

The department has in use 285 sets of telephones, which it rents from the New York and New Jersey Telephone Company, and 25 sets of dial telegraph instruments, the property of the department. A complete outfit of batteries, gravity, Leclanche and dry, are also the property of the department, and the police patrol telegraph system with telephone booths is used. Messrs. Pearce & Jones furnished this apparatus, the mechanical arrangements, telephone, etc., being enclosed in an iron box, which can be attached to a telegraph pole or wall similar to a fire alarm box.

The city is thoroughly well covered with this method of conveying intelligence, and Superintendent Mason has received many compliments over his very complete and comprehensive system.

The Brooklyn department was recently visited by the leading police officials of New York city, who received much interesting information from an inspection of Superintendent Mason's department.

The report, which has just been issued, concludes with the following statements and recommendations by Superintendent Mason:

In our general telegraph and telephone system 35 miles of old wire have been replaced with new insulated "Candee" wire, the new wire in most cases having been strung on the structures of the Kings County and Union Elevated Railroads, permission having been obtained from the companies to do so, on Myrtle avenue, Fulton street and Broadway, thereby allowing us to remove our wires from poles at many points.

The Okonite cables placed on the elevated railroad structures during 1888 have given entire satisfaction, and cannot be too highly recommended, as will be seen by the following record of contact with electric light wires, said contacts having occurred beyond the cable terminals.

February 9, 1889, twelfth precinct wire crossed with electric light wire.

May 2, fifth, seventh and sixteenth dial wire crossed with electric light wire.

September 10, dial wire of fourth, ninth, fourteenth, twelfth and seventeenth crossed with electric light wire.

Notwithstanding the above severe tests to our cables, it gives me pleasure to report that they show no signs of being injured, and are of as high standard of insulation as when placed in position.

The 2,000 feet of 10 conductor Okonite cable placed in the underground conduits, from police headquarters through Joralemon and Court streets to Pacific street, in 1889, have thus far worked more satisfactorily than when overhead wires were used. At the present time all of the wires of this department enter headquarters through underground conduits. Our cable system, at the present time, is as follows, viz:

Three thousand two hundred feet of 10 conductor cable on the Union Elevated Road, on Myrtle avenue from Fulton to Canton streets; 3,200 feet of 10 conductor, 470 feet of 15 conductor, 400 feet of 25 conductor, on the Kings County Road, through Fulton street from Myrtle to Hudson avenues; 2,000 feet 10 conductor in the underground conduits through Joralemon and Court streets, and 450 feet 25 conductor cable in underground conduit connecting the wires strung on the elevated roads with these headquarters. Total length of wire in underground conduits, 31,250 feet. Total length of wires in cables strung on elevated railroad structures, 71,050 feet.

The severe storms of the past year, which rendered useless many telephone and telegraph wires in this city, did very little damage to our telephone, telegraph and police signal telegraph system; communication between headquarters and the several station houses of this department, by telephone, suffered little interruption. As will be seen by the daily reports furnished the superintendent of police, the police signal telegraph system in the first, second, fourth, fifth, sixth, seventh, eighth, tenth, eleventh, twelfth, fourteenth and sixteenth precincts suffered little, if any, interruption. The above satisfactory condition of our wires, during severe storms, is entirely due to the good quality of insulated wire used and careful construction.

I would respectfully suggest that means be provided to extend our telegraph system both underground and on the elevated railroad structures, as experience for the past four years has practically demonstrated that that is the only sure way of maintaining communication between headquarters and the various station houses throughout the city during rough and stormy weather.

Brooklyn City Railroad Company Leased by a Syndicate.

President Lewis, of the Brooklyn City Railroad Company, which controls the majority of the surface railroads in that city, has announced that a syndicate of capitalists, represented by the New York Guaranty and Idemnity Company, have made a proposition for the lease of the road. The lessee guarantees 10 per cent. dividends on the $12,000,000 stock of the company, and will deposit $4,000,000 as a guarantee fund for the performance of the lease. The syndicate is to give each stockholder the right to purchase three shares of a traction company's stock, of the par value of $100 each, for every 10 shares, of the par value of $10 each of the present holdings, at $15 per share. The capital stock to begin with will be fixed at $30,000,000, and by this arrangement nine-tenths of the capital stock of the new traction company will remain in the hands of the stockholders. The surplus at the time of the delivery of the lease is to be divided among the stockholders, and the right to purchase stock in the new company will remain open for 60 days after the lease has been perfected.

At a meeting of the Board of Directors, at which the proposition of the syndicate was considered, it was unanimously decided to recommend its adoption by the stockholders. There is no doubt whatever that the stockholders will ratify the proposition. It is said that the syndicate referred to is the Widener-Elkins syndicate, which already has such large street railway holdings. It is understood that Mr. J. B. Parsons, now general manager of the West Chicago Street Railway Company will be the general manager of the new traction company.

Tommassi's Accumulator.

This secondary battery consists of elements made up of tubes of lead, or rigid insulating material, such as celluloid pierced with numerous holes to admit the electrolyte. Each tube has a lead connecting wire down its centre, making contact with the active material which occupies the rest of the tube. The inventor, Dr. Donato Tommassi, of Paris, claims that this arrangement gives a much larger capacity per pound of total weight. It also reduces the volume of the cells. The following particulars have been given us by the inventor: Charging current, two and one-quarter to two and three-quarters amperes per pound weight of electrode; discharge current, up to one and three-quarters amperes per pound, down to electromotive force of 1.7 volts. The cells can give as much as three and one-half amperes per pound on emergency; capacity, 9 ampere hours per pound of electrode; Coulomb efficiency, 95 per cent.; Joule efficiency, 80 per cent. M. Tommassi claims that his accumulator has from three to six times the capacity of the ordinary accumulators, weight for weight. If the accumulators turn out as well in commercial use as in Dr. Tommassi's laboratory—as we trust may be the case—they will be a great advance beyond present practice. A company with £9,000 capital has been formed to manufacture these accumulators. We may add that we are not very sanguine about this accumulator, as the principle is some decades old; but Dr. Tommassi may have improved the details enough to obtain the excellent results claimed.—*London Industries.*

ELECTRIC LIGHT FLASHES.

Swanton, Vt., is to have electric lights.

The electric light service at Niagara Falls is to be extended and improved.

An electric light and water works plant is being put in at Alvarado, Tex.

Onalaska, Wis., is considering the question of going $30,000 in debt for electric lights.

The central supply station for the Champs Elysees district, Paris, will soon be in operation.

The Doylestown, Pa., Electric Light Company is installing a new 100 horse-power Ball engine.

The Trenton, N. J., Brewing Company have installed an Edison plant with a "New York Safety" engine.

The Salem, Mass., Electric Light Company declared its usual quarterly dividend of 1½ per cent. on January 1.

About $50,000 will be spent at Fergus Falls, Minn., next spring in the construction of a dam and electric light plant.

The city of South Norwich, Conn., owns an electric light plant of sixty 2,000 candle-power lamps, which cost $20,869.33.

The Washington Park Club, Chicago, have contracted for a New York Steam Power Company's 50 horse-power engine and Edison electrical plant.

The extreme cold weather has delayed the new electric light company in carrying out its intentions of lighting the city of Edwardsville, Ill., by January 1.

The electric light company at Middletown, N. Y., celebrated its first anniversary on December 24. The original capacity of the station has been nearly doubled.

The Braddock, Pa., Electric Light Company has erected a brick addition 50x130 feet. Two new batteries of seven boilers each, with engines and dynamos, have been added.

The Edison Electric Illuminating Company, of New York, has declared a dividend of 1¼ per cent., payable February 1, to stock of record January 6. The books closed January 6 and reopen January 27.

These men have been elected trustees of the Citizens' Electric Illuminating Company, of Brooklyn, for the ensuing year: Under Sheriff Hugh McLaughlin, James Shevlin, Anthony Barrett, Thomas Nevins and John Delmar.

Detroit is another city that is struggling with the municipal lighting question. The mayor, a republican, advises that the city buy and run its own electric light plant, and the leading republican paper, the Detroit *Tribune*, endorses him.

The employés in the dynamo room at the Westerly, R. I., electric light station were surprised to find a mink quietly reposing therein recently. The animal was quickly disposed of by the use of clubs. It was a fine specimen 23 inches long.

Dr. Lewis Swift, of Warner's Observatory, at Rochester, N. Y., and other astronomers claim that the gleams from the electric lights make accurate observations impossible. They are trying to get the electric companies to adopt shades that will overcome the difficulty.

The Commercial Electric Light and Power Company, of Tacoma, Wash., has sent, through its attorney, a communication to the council asking that the city recognize that the company is the successor to all the rights of the Tacoma Electric Company. This action is taken with a view to obtaining a reversal of the statement of the city attorney to the effect that the company has no rights to the use of the streets.

The New York Gas Commission rejected, on December 30, the bid of the New York and New Jersey Gas Light Company to light Woodlawn Heights with naphtha, and decided to light that district with electricity. One hundred and fifty naphtha lamps will be replaced by about 40 electric lamps. The commission also decided to light Vanderbilt avenue, in the Twenty-third and Twenty-fourth wards, with electricity where it is now lighted by gas.

Again there has been a change in the affairs of the South Omaha Electric Light, Heat and Power Company. Superintendent J. T. Smith, who but recently relieved Superintendent Breakey, has been in turn removed as superintendent of the electric department, and J. L. Wiley, of Omaha, appointed in his place. The new superintendent is a well known Omaha electrician and owns stock in the company. He is a son of S. L. Wiley, president of the Omaha Electric Light Company.

The Northwest General Electric Company, Howard C. Lewis, H. M. Byllesby, H. C. Akely and C. H. Maxey, the holders of 4,837 shares of stock in the Edison Light and Power Company, of St. Paul, Minn., have filed a petition in the district court asking that that corporation be dissolved. The petition states that the corporation owes $200,000 and has entered into negotiations for the sale of its plant and building, and that if such sale is allowed to be consummated it can pay off all indebtedness. It asks that as soon as it settles its debts, the sale be made and a division of the stock as well, the corporation be dissolved.

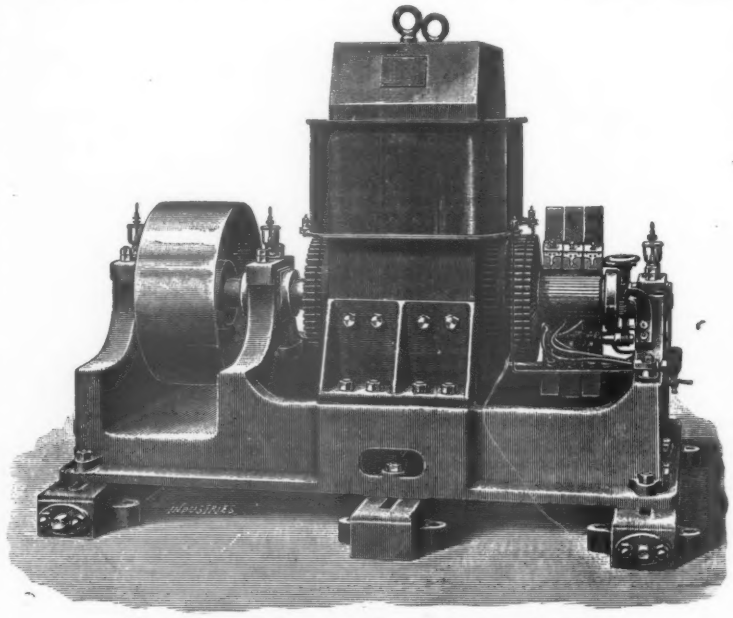
The Taunton, Mass., Electric Lighting Company is preparing for a large increase of its facilities. There will be three 250 horse-power boilers and a 500 horse-power compound engine. A plant has been purchased which will include two 500 light Brush arc machines, and a new 2,000 light incandescent machine has been purchased. But the most important improvement contemplated is the establishment of a day circuit for the running of motors for light manufacturing purposes, and this will undoubtedly be started early in the spring. The electric lighting station will then be equipped for running 5,000 incandescent lights and 300 arcs, and there will be 200 horse-power for motors.

Important changes are being made in the plant of the Hartford, Conn., Electric Light Company. Instead of running a small separate engine for each dynamo with steam from the boilers, there will be one large motor to supply all the dynamos. The electricity from the power station on the Farmington river will be used to run this big machine, but in case of emergency the power of one or both of two engines, now in position in the engine room, will be utilized. A new line of shafting will be run from the engines to the large motor. The floor of the building will be raised about three feet, and the belting will be on a level with this raised floor. Excavations for the foundations of the new motor are now being made.

King, Brown & Company's Direct Current Dynamo.

The illustration which is herewith reproduced from London *Industries* shows the general arrangement and construction of the latest type of dynamo manufactured by Messrs. King, Brown & Company, Edinburgh. This special machine was designed and built to the order of Mr. James White, of Glasgow, and will be used to a great extent for charging storage cells required in standardizing Lord Kelvin's electrical instruments. For this purpose it is wound as a shunt machine, but similar machines with compound winding are also made. The total output is 300 amperes at 120 volts when running at a speed of 720 revolutions per minute.

The dynamo is of the two pole type, with the whole magnetic circuit of a special quality of wrought iron. The field magnet coils are wound on suitable brass cases, which are supported by checks on the pole-pieces. The armature is of the drum wound pattern and has 112 bars, which are driven by hardwood pins fixed at intervals on the core. The core is composed of re-annealed charcoal iron disks securely attached by means of a feather to the spindle. The commutator, which is of large diameter and very substantially built, is of hard drawn copper with mica insulation, and is mounted on a gun metal sleeve driven by a small feather on the shaft. The brush holders



KING, BROWN & COMPANY'S DIRECT CURRENT DYNAMO.

are fitted with springs so as to adjust the pressure on the commutator, the whole being mounted on a movable bracket with rack attached, gearing into a worm. They can by this means be rotated about the commutator, forming a very convenient self-locking arrangement. Sparking at the brushes has been entirely eliminated, and very little alteration of their position is necessary when once properly set, even with a variation from zero to full load. The lubrication is on the sight feed principle, suitable means being taken to carry away the waste oil.

This design of machine coupled direct to engines has, we believe, also given great satisfaction for ship lighting, the combined plant being a specialty of the makers.

Charlie Knows All About Electricity.

Charlie Johnson's latest feat in the mechanical line is the building of an electric dynamo with a capacity of 50 lights, which he has sold to parties in Chicago. Charlie had the castings made in Chicago and then put the machine together, wound it and then put the machine in running order so that it works to perfection. What Charlie doesn't know about electrical machinery isn't worth mentioning.—*Tomah, Wis., Journal.*

An electric railway from Woodbury to Camden, N. J., is being discussed.

TELEGRAPH NEWS.

The Western Union Telegraph Company has completed its line to Lookout Mountain, Tenn.

The Postal Telegraph Company expects to move into new and handsome offices at Springfield, Mass., by February 15.

The telegraphers of New York city have decided to hold a tournament on March 11. There will be competitions for men and women, which will be open to all comers.

The Pan Handle company has opened up a telegraph office at Molands Siding, on the hill west of town. The building is smaller than the man, as he has to back out so he can turn around.—*Richmond, Ind., Item.*

Miss Winnie Chase, telegraph operator at the St. James Hotel, Denver, will be married February 10 to George Wagner, operator at Wichita, Kan., whom she has never seen. Their courtship was carried on entirely by wire.

The lease of the Commercial Union Telegraph Company to the Postal Telegraph has been completed. The papers were signed December 28. The lease is for 99 years from January 1, 1893 and the terms six per cent. on the Commercial Company's stock.

The Wabash railroad company has issued orders closing eight of the small telegraph offices on its lines in the 17th district. The list includes Cornell and McDowell, on the Streator branch, and the following on the Chicago division: Galesville, Richie, Blue Ridge, Proctor, Osman and Foosland. This leaves only one telegraph office between Fairbury and Streator, Ill., a distance of 32 miles. The small telegraph offices on all the lines will be abandoned.

The Corrosion of Aluminium.

Amongst the many fictions which have been disseminated concerning aluminium, says the London *Electrical Review*, is that of its incorrodibility by sulphuric and nitric acids whether dilute or concentrated: this statement has, strange to say, been subscribed to by such eminent authorities as Deville, Wustz, Hunt, Langly and Roscoe, whom, it must be presumed, did not use the pure metal in their experiments. Mons. G. A. Le Roy, having been induced to study the possibility of replacing lead and platinum by aluminium in various manufactories, has been surprised to find that the statements of these authorities are entirely incorrect on this point. Experiments made with four different samples of aluminium, the composition of which is stated, two of them being made by Deville's process at the old Nautern Works by Messrs. P. Tronin & Co., show that the pure metal is so rapidly attacked by strong nitric and sulphuric acids even in the cold, as to be quite unfit for use in manufactures or processes in which these acids take any part.

Chromium by Electrolysis.

In a recent issue of the *Comptes Rendus*, of the Paris Academy of Sciences, M. Em. Placet describes a new method of preparing chromium by electrolysis. An aqueous solution of chrome alum is first made, to which is added an alkaline sulphate and a little sulphuric acid, and a current is then passed through the solution. Pure chromium is then deposited at the negative pole. Thus prepared, the metal is of a blueish-white color and very hard. It resists atmospheric influences, and is not attacked by concentrated sulphuric acid, by nitric acid, or by a concentrated solution of caustic potash. It is proposed to carry chrome plating on an industrial scale to replace the nickel plating. Good adherent deposits of chromium have been obtained from the same bath on brass, gun metal, copper, and even on iron. The deposit is said to resemble oxidized silver. An ingot of the pure metal, weighing one pound, has been prepared and sent to the Academy by the inventor of the process, who is now engaged in investigating various alloys of the metal.

TELEPHONE CHAT.

The telephone system at Chester, Pa., is being improved.

Dunkirk and Fredonia, N. Y., will have long distance telephone service.

Improvements in the trunk line service at Troy, N. Y., have been recently made.

More modern instruments have been installed in the telephone system at Clearfield, Pa.

The telephone line between Hopkinton and Concord, N. H., has been recently repaired.

The local telephone company, at Belleville, Mo., is remodeling its offices and enlarging its service.

The Hudson River Telephone Company are renewing their main line in the northern part of Gloversville, N. Y.

The capacity of the telephone exchange at Ft. Worth, Tex., must soon be increased to meet the demands of subscribers.

The telephone line from Uxbridge to Milford, Mass., is to be abandoned and a new line constructed to Worcester direct.

The telephone line between Little Rock and Pine Bluff, Ark., is nearing completion and will probably be open for business this week.

West Springfield, Mass., telephone subscribers are complaining of the interference of the new trolley road with the telephone service.

The Wisconsin Telephone Company purchased 1,800 pounds of turkey just before Christmas, and on Christmas Eve every employé took home a fat gobbler.

The telephone line between Indiana and Punxsutawney, Pa., has been used as a support for a bird's nest. People using this line will thus talk through a bird's nest and not through their hats.

Geo. M. Macey, who has had charge of the telephone system at Cairo, Ill., for the past year, has been transferred to Cedar Rapids, Ia., and W. H. Smale, of Burlington, has succeeded him.

The American Telephone and Telegraph Company are considering the advisability of connecting Chicago, St. Louis and Kansas City. The rate for a five-minute talk from Chicago to Kansas City would be $5.

In a recent change in the law relating to the operation of the Swiss railways, the Federal Council reserve the right of permitting the use of the telephone, instead of the telegraph, for transmitting signals.

Telephone communication between New York and Brooklyn is another feature of the past year.—*N. Y. World, Jan.* 1, '93.

We call upon the Hon. W. D. Sargent, of Prospect Heights, Brooklyn, to express his feelings in this matter.

New poles are being set by the New England Telegraph and Telephone Company between Spencer and Leicester, Mass., the object being to raise the telephone wire several feet above the electric railway wire, and thus diminish the influence of the latter.

N. J. Carney, formerly superintendent of the Central Union Telephone Company, of Ohio, but now of the Chicago Telephone Company, together with Mr. Hick and Mr. Clark, also of the Chicago Telephone Company, are inspecting the different exchanges in Ohio.

Messrs. Fuller, Harding & Company, of Boston, have made arrangements with the Erie Telegraph and Telephone Company to anticipate the delivery of the second instalment of the six per cent. bonds, and now offer them to investors at a slight advance over the price of the first issue sold to financial institutions and individual investors. The bonds are secured by a deposit with the Boston Safe Deposit and Trust Company, of dividend paying stocks of three sub-companies owned and operated by the Erie Telephone Company, having a market value at a low estimate of $2,000,000.

What Constitutes Good Vulcanized India Rubber?

An investigation has recently been conducted by Lieut. L. Vladimiroff at the St. Petersburg Technical Institute, says a foreign exchange, with a view to establishing rules or tests whereby the quality of vulcanized india rubber may be efficiently judged. It is a notorious fact that no method of chemical analysis gives reliable results for this substance; hence, the tests applied were chiefly of a physical nature. From a lengthy series of experiments the following conclusions were deduced, namely: 1. India rubber should not give the least sign of superficial cracking when bent to an angle of 180 degrees after five hours of exposure in a closed air bath to a temperature of 125 degrees Centigrade. The test pieces should be six centimetres thick. 2. Rubber that does not contain more than half its weight of metallic oxides should stretch to five times its length without breaking. 3. Caoutchouc, free from all foreign matter except the sulphur used in vulcanizing it, should stretch at least seven times its length before rupture. 4. The extension measured immediately after rupture has taken place should not exceed 12 per cent. of the original length of the test piece of rubber. The test piece should be from three to twelve mm. long, three cm. wide, and not more than six mm. thick. 5. Softness may be determined by measuring the percentage of ash formed on incineration; it may form the basis for deciding between different grades of rubber for certain purposes. 6. The vulcanized rubber should not harden under the influence of cold temperature. These conclusions are to serve in the establishment of rules governing the introduction of vulcanized rubber into the Russian navy.

Secondary Batteries at Central Stations.

The use of batteries in central stations seems to be now exciting special attention in America. No one can deny the great value of batteries in small stations, or at the beginning of a larger undertaking, and we wish Mr. Crompton every success in his endeavors to get batteries taken up seriously in the United States. Where we disagree with established notions on the subject is, as to their use in alternating current work. Mr. Mordey has, as is well known, studied batteries for some time in the sort of way a naturalist studies vermin. The first thing he found out was that "the great advantage of alternating currents is that people cannot put batteries on." After further investigation he found that "the great difficulty with cells is that they are not equally bad." Still further observation has led him to admit that "batteries must have strong constitutions to stand the treatment of their specialists." Without venturing to contradict Mr. Mordey on the second and third points, exception may be taken to his first statement. As has been often pointed out in this journal, batteries are just as easily applied to alternating systems as to direct. All that is needed is a direct current machine which can be employed either as a generator or a motor. Some day—in 10 years let us say—people will realize that there is nothing in the nature of alternating currents which necessitates 2,000 volts and continuously running steam engines, and that batteries do not always entail a building one side of the station entirely of switches and cell connections.—*London Industries.*

Trolley Authorized in Philadelphia.

The Pennsylvania Supreme Court at Philadelphia, on January 3, reversed the judgment of Common Pleas Court No. 4, in the cases of Haines, Reeves and Watkin against the Twenty-third Street, Continental and West Philadelphia Passenger Railway companies, popularly known as the "trolley cases." These three cases included all the questions involved in the claim of the Traction Company to be vested by law and the ordinances of councils with the right to occupy the streets with trolley poles and wires, and the decision of the court, as rendered by Justice Mitchell, is a sweeping victory for the corporation

New Submarine Cables for Thunder Bay.

The following communication appeared in the ELECTRICAL REVIEW for September 3, 1892:

THE McKINLEY TARIFF AND SUBMARINE CABLES.

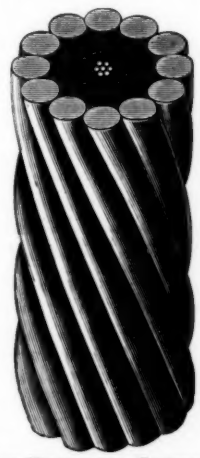
TO THE EDITOR OF ELECTRICAL REVIEW:

The following, clipped from the *Electrical Engineer* of August 24, page 177, is a good sample of free trade *truth*, *logic* and *arithmetic:*

IMPORTING SUBMARINE CABLE.

Under the new McKinley tariff law, importations by the United States Government are no longer free of duty. As the result of these changed conditions, Prof. Harrington, chief of the Weather Bureau, informs the Secretary of the Interior that the cost of the cable for two proposed weather signal stations on islands in Lake Huron is doubled. His original estimate of the cost of seven miles of cable was $10,500 or $1,500 per mile, but he now wants $21,000 or $3,000 to meet the additional cost on account of the duty.

The duty on submarine cables was not changed by the McKinley bill. It is and was 35 per cent. *ad valorem.* How this can double the cost is a problem which free trade arithmetic alone can solve. The McKinley bill requires the government to pay the same duty as its citizens and corporations by whom the government is supported; but there is a very material difference when the individual or corporation imports the cable and pays the duty; the 35 per cent. is gone from the purchaser; but when the government imports and pays the duty it pays the 35 per cent. to itself and is no poorer by the operation. Or, if perchance, this additional price forced upon all purchasers compels the government as well as others to buy at home, then the money all goes to the laborers and capitalists of this country and helps them to bear its terrible (?) taxes, and the government can console itself, as did the young man whose bank account was seriously lowered by a present to his best girl, when he said to himself,



FULL SIZE VIEW OF A SECTION OF THE BISHOP GUTTA PERCHA COMPANY'S SUBMARINE CABLE FOR THUNDER BAY, MICH.

"Never mind, I will soon have that present back and the girl with it." As to the figures given as estimates, I will say that the first estimate is nearly three times as much as the life saving service pays for similar cables of domestic manufacture, and I think there are at least three companies in this country who would be glad to make and lay for Professor Harrington his seven miles of cable for less than $10,000. Yours truly,

HENRY A. REED.

New York, August 25, 1892.

Mr. Reed is the secretary of the Bishop Gutta Percha Company, of this city, and recent developments have proved the truth of his assertions, as well as the fact that the controversy indicated above resulted in the Bishop Gutta Percha Company securing an order from the United States Government Weather Bureau for 6½ miles of cable at a contract price of $7,500, which was mutually satisfactory.

As is well known, the storms on the great lakes are of intense severity and rival in violence many ocean gales. The coasts along the shores of the great lakes are in some places extremely dangerous, and it is of vital importance to the shipping interests in that section of the country to be kept fully informed as to the state of he weather and the probable approach of storms. The Weather Bureau has deemed it advisable to establish stations on Middle Island and Thunder Bay Island, which are located in Lake Huron, about 12 miles northeast and 15 miles east, respectively, from Alpena, Mich. A peninsula extends out into the lake, and from this point of land a cable two and one half miles long to Middle Island, and another cable four miles long to Thunder Bay Island will be laid in the spring, as soon as the weather permits. There is a land line connecting the cable houses on shore with the city of Alpena. The object of these facilities is to inform the island stations of the probable state of the weather, so that the regular signals of the Weather Bureau may be displayed and *vice versa*, for the operators on the islands to inform the operator in Alpena of any changes in the weather which may come under their observation.

The Bishop Gutta Percha Company has just shipped to Alpena the cables to provide this service between the islands and the main land. Our illustration on this page shows a full size perspective view of a section of the cable shipped.

The four mile cable was shipped in two pieces to facilitate its handling. It will be spliced while being laid. The Weather Bureau has undertaken to lay both cables, although the Bishop Gutta Percha Company will provide a supervising engineer. The cable is all of one type, which is that of one conductor formed of a strand of seven No. 22 B. & S. copper wires, with a conductivity of 96 per cent. The cable has a resistance of 12.20 ohms per statute mile at 70 degrees Fahrenheit. The interstices in the conductor are filled with Chatterton's compound, and the whole is covered with three coatings of the best gutta percha homogeneous to a diameter of .26 of an inch. The insulation as tested was over 400 megohms per statute mile after the cable has been submerged in water for 48 hours at 70 degrees Fahrenheit. The core is served with three layers of tarred jute, and the served core is armored with 12 No. 5 B. W. G. best galvanized iron wires, spirally laid.

As before stated, the cables have already been delivered at Alpena on reels ready for laying by the government officials. The importance of the Weather Bureau service to the shipping interests of the country cannot be overrated, and it is of prime importance that the tools they have to work with should be of the best. It is also a matter of pride that an American manufacturer has been able to demonstrate the fact that the McKinley bill has not interfered with the obtaining of proper cables at a proper price.

Indian Fakirs and Electricity.

Prof. Harry Kellar, the well known magician, has a very interesting article in the *North American Review* for January, entitled "High Caste Indian Magic." We quote the following paragraph:

I have heard in India that the fakirs walk in the air, but I have never met an eye witness of this feat; the accounts given me came second or third hand, and related that the magician laid himself flat upon the earth, face downwards, for a minute or a minute and a half, then arose, and, pressing his arms tightly against his sides, stepped forwards and upwards as if upon an aerial stairway, walking up into the air to an altitude of several hundred feet. My informant said that it was thought this might be done through an occult knowledge of electrical currents, as if these fakirs changed at will the nature of the electrical current with which their body was charged from the negative to the positive or *vice versa*, inhaling an electrical influence from the earth which had the effect of destroying the force of gravity. But this seemed to me, as it still seems, unintelligible.

The Trolley in Parades.

In a recent street parade in Wilmington a novel method of illuminating the floats was employed, says the Pittsburgh *Times.* The electric railway company undertook the contract for lighting the moving tableaux with incandescent lamps. To carry out their scheme it was necessary to connect the floats in some way with the trolley wires. The connection was made by means of a simple yet compact trolley. A piece of stiff, spring, brass wire was coiled in two planes, the lower coil being horizontal and fastened to the float, and the other vertical and carrying the main trolley arm. The end of the latter was a broad, shallow piece of metal with upward curving edges. The ground connection was obtained by means of a little iron wheeled car underneath the wagon and built to fit the tracks. The floats were brilliantly illuminated, and were voted a great success.

ELECTRICAL REVIEW

Published at 13 Park Row,
P. O. Box 3329. NEW YORK.

EDITOR:
CHARLES W. PRICE.

ASSOCIATE EDITORS:
STEPHEN L. COLES.
ROBERT H. READ.

REGISTERED CABLE ADDRESS:
"ELECTVIEW," NEW YORK.

"1546 CORTLANDT." TELEPHONE CALL.

BOSTON OFFICE:
H. G. TUCKERMAN, Room 29, 620 Atlantic Ave.

WASHINGTON OFFICE:
GEO. C. MAYNARD, 1409 New York Ave.

CHICAGO OFFICE:
MERWIN J. BULKLEY, 435 "The Rookery."

EUROPEAN OFFICE:
JOSEPH FFRENCH, Editor for Europe.

HOTEL VICTORIA,
Northumberland Ave., Charing Cross, London, W. C.

Cable Address: - - "Electview," London.
Telegraphic Address: Ffrench, "Victoriola," London.

ADVERTISING DEPARTMENT,
H. T. RICHARDS, Manager.

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SUBSCRIPTION TO THE ELECTRICAL REVIEW.

One Year, United States and Canada, - $3.00
One Year, Foreign Countries, - - 5.00
Single Copy, - - - - - - - .10

NEW YORK, JAN. 14, 1893.

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THE OPINION OF AN AUTHORITY:

"The editorials appearing in ELECTRICAL REVIEW have been of untold value to all electrical enterprises."

· A. M. YOUNG.

The electric railway is enjoying an especial boom in Pennsylvania, California and several of the New England States.

The Bellamyites in Springfield, Mass., are cast down because Mayor Sibley has refused to sign the municipal electric lighting bill. This is more effective than a veto, as it leaves the aldermen helpless.

One of the best methods to pursue for a suburban community which considers itself neglected in the matter of electrical rapid transit is to form an electric railway association for the purposes of agitation. Methods similar to those used in political campaigns are available for this purpose. Such a scheme has been found to work well in a number of instances in the West.

A political rumor is to the effect that Henry Villard may be appointed United States Minister to the Court of Berlin, or he may receive a Cabinet position.

It is gratifying to learn that a course of lectures on electricity, given upon the University Extension plan, has been arranged by the Society of Natural Sciences and the Electrical Society, of Buffalo, N. Y.

Postmaster-General Wanamaker's latest recommendation of a postal telephone and telegraph system has stirred up the Nationalists again, and a movement in favor of the scheme has been started in New England.

Philadelphia papers are going into raptures over the lately adopted trolley system in that city. The city of brotherly love is slowly getting there, but our brothers should not make such a fuss over something all smaller cities in the State adopted long ago.

The New York Assembly could solve its United States senatorial problem by electing Col. William L. Brown, who is at present State senator from this city, and proprietor of the *Daily News*. Col. Brown is a gentleman of progress, is president of the Ball Electric Light Company, of New York, and is a good man of proper weight and sufficient intellectuals.

The Providence *Journal* is usually well informed upon matters electrical, and gives added evidence of the fact when it says editorially:

"When a metropolitan newspaper talks about the extension of the trolley system in New York as a 'death-dealing invasion,' it exhibits a provincial ignorance that might sooner be expected in some isolated and unintelligent rural community."

There is sense as well as wit in the proposal of a London newspaper that instead of a machine to take pennies in, one be devised to throw them out. The machines are to be exposed in public places, and when a hungry tramp finds one he can turn the crank until he has developed and stored five cents' worth of electrical energy, when the coin will drop out into his hand. The stored power can be sold for mechanical purposes.

In many sections of the country the value of farm products to the producer depends to a large extent upon his ability to promptly reach a market, or, what is much the same thing, a trunk line in direct connection with a market. The difficulty lies in the little connecting link between the farm and the nearest railroad. What better method could be afforded than a trolley line for such service? We confidently expect to see the day when systems of trolley roads for this purpose will be found in every farming district of the country. The advantages of such a plan are many.

The trolley system has gained what promises to be a firm foothold on Manhattan Island, the New York Board of Aldermen having granted permisson to the Union Electric Railway Company to extend its electric roads as far south of the Harlem as 125th street. This is good news. The cable, horse car and elevated railway service is often inadequate for the proper handling of passenger traffic in this portion of New York. These southern extensions of the trolley system will also be a boon to citizens of the annexed district, who are anxiously awaiting the benefits of rapid transit.

Mr. William Taylor, of the electrical supply firm of Taylor, Goodhue & Ames, Chicago, recently contributed an article on the progress of electricity during 1892 to the *News Record*, of that city. The writer states that our government is seriously considering the advisability of dispensing with all other forms of light, power and heating and cooking apparatus at a certain military post and substituting electricity. There is no doubt that before the close of 1893 wonderful strides will have been made in this direction, and electricity will have been found as useful for heating and cooking as it has proved itself to be for lighting and power.

THE INSURANCE OF ELECTRICAL RISKS.

The insurance interests of the country are pursuing a policy toward the writing of electrical risks which, if not remedied at an early day, will result in seriously crippling the whole electrical industry. If a man who instals an electrical plant thereby vitiates his insurance or, what is the same thing, is asked to pay a prohibitive rate, it is very easy to see where the matter will end. And where does the fault lie? Just at present it seems to be with unscrupulous electrical contractors and construction companies who see fit to take contracts at such a price as to render safe and reliable work impossible, unless carried out at a loss. Or this class of companies may take work at a losing figure and, knowing that the installation will prove unreliable, hope to make up their losses on the original contract and gain a dishonest profit besides, by doing repair and "extra" work which will keep the plant from breaking down entirely or all at once.

It has been demonstrated very many times to the satisfaction of competent engineers and insurance experts, that a building containing an electric lighting plant, *properly installed*, is a much safer risk to write than where any other known form of illumination is used. This is undeniably a fact.

The New York Board of Fire Underwriters at a recent meeting has modified its rules on classes of hazards so that now "all trades and occupations requiring the use of fire heat, *electricity*, or the use of kerosene oil or gas jets, not otherwise enumerated," are subject to a "special" rating. And we all know what this means to the policy holder.

It makes an honest and conscientious electrical engineer's blood boil to have the use of electricity classed under a hazard which makes the risk equal to that where kerosene oil is used. The unscrupulous construction firms who have brought about this state of affairs are not only working an injury to the whole electrical industry, but, through the following of such a short-sighted business policy as this certainly is, they are ruining their own prospects for future work.

The remedy for this evil, which is a fit subject for heroic treatment, lies in the formation and adoption by fire underwriters of a set of just rules, preferably national in its scope, in accordance with which all electrical installations must be made. Such rules must be followed up by a rigid system of inspection, and all unworthy work should be immediately condemned as soon as discovered. Insurance should then be withheld until the installation conformed to the requirements in every detail. If such a plan can be put in operation, the standard of electrical construction will be elevated, and the insurance premiums will be correspondingly lowered.

In this connection the following paragraph from a recent issue of the London *Electrical Review* is especially pertinent:

"We learn on unimpeachable authority that, notwithstanding the thousands of electric light installations carried out during the past eleven years, not one shilling has been paid by the Phœnix Fire Office as compensation for fire on any work passed by their inspector, or which has been carried out strictly in accordance with their rules."

We must have construction and engineering companies of integrity and professional standing, who will refuse all work that cannot be done honestly and at a fair profit. There is plenty to do for such companies and they will have the insurance men on their side every time, instead of against them, as when unreliable work, which places them on the "black list," is being done. It should not be a difficult task for an honest wiring contractor to show his customers that first-class work, giving him a fair profit, is the most economical for them in the end. On the one hand, is honest, reliable work, which will last and do its duty under a low premium of insurance, while on the other hand, is cheap, unreliable, dishonest work, which can never be depended upon to operate correctly, with an insurance premium of any amount the underwriters may name, or what is still more probable, the refusal of the risk at any price. As insurance is something no good business man is ever without, the alternative would seem to be easy to choose.

CORRESPONDENCE.

OUR BOSTON LETTER.

The New York Insulated Wire Company have just opened a branch office at 182 Summer street, this city, where they will carry a full line of their celebrated "Grimshaw" wires and other specialties. Mr. Walter S. Barker is in charge of the New England territory.

The American Electrical Works, of Providence, R. I., are putting out one of the neatest calendars for '93 that we have yet seen. Their "new version" of the "old song" will warm the hearts of their many friends, and those who have not yet received the souvenir should send for one without delay.

The annual meeting of the Haverhill Electric Company was held January 4, and the following officers for the ensuing year were elected: President, Martin Taylor; secretary and treasurer, C. W. Morse; directors, M. Taylor, C. C. Griffin, B. B. Jones, C. E. Wiggin, C. N. Kelly, W. H. Floyd, F. C. Wilson, W. A. Brooks, C. W. Morse.

The Curtis Regulator Company, of this city, have consolidated with the D'Esté & Seeley Company, and will be known in future under the latter name. Commodious quarters have been secured at 29–33 Haverhill street, and they are starting the new year with increased capital and facilities. The officers of the new concern are Julian D'Esté, president, and Nelson Curtis, treasurer.

The Boom in electric railway construction throughout New England, which was predicted by the REVIEW some weeks ago, has already started with a rush, and the State of Connecticut promises to be the scene of intense rivalry in this direction during the coming year. The legislature is completely "snowed under" with applications for charters and franchises, so much so that a special committee is talked of to handle this business exclusively.

The Third Annual Ball of the Massachusetts Association of Electrical Engineers will be held at Odd Fellows' Hall, on the evening of January 30 next, and no pains have been spared to make it a most successful affair. The interior of the hall will be beautifully decorated, and 1,500 incandescent lights in various colors and unique designs will contribute to the general effect. An immense gathering is looked for by the managers, who are determined to make it the most memorable event in the history of the Association.

The Consolidated Electric Manufacturing Company, of Boston, are now coming strongly to the front with their arc lighting system, and are putting an automatically regulated arc dynamo on the market which will undoubtedly prove a strong competitor for business in this field. The workmanship on their apparatus is of the best, their "Elkins" regulator is both sensitive and reliable, and the entire system has proved under severe tests, the most efficient yet devised. The company are anxious to sell their machine strictly on its merits, and offer a strong guarantee and a trial of 30 days to prove its qualities.

The Hartford and Wethersfield Horse Railroad Company has petitioned for an increase of its capital from $200,000 to $1,000,000, and for permission to construct electric lines from Hartford to Newington, Farmington, Windsor, South Windsor and New Britain. They already control a charter under which they can build a line to South Manchester, a distance of 10 miles. A new company known as the "Hartford Suburban" is also in the field, endeavoring to consolidate all the roads centering in Hartford and also to run lines to Farmington, New Britain, Wethersfield, Rocky Hill, Cromwell and Middletown. The above is a fair sample of what is going on in almost every section of the State, and some idea may be obtained of the extent of the operations proposed from the fact that plans are now under way for connecting no less than 65 cities and towns in Connecticut alone by electric traction.

The Probabilities are that New Bedford and Fall River will soon be connected by an electric road, since two companies are struggling for a franchise. Some weeks ago the Fall River and New Bedford Street Railway Company petitioned the legislature for a charter to operate an electric line between the above named places, passing through the towns of Dartmouth and Westport. Now the Dartmouth and Westport Street Railway Company have come to the front, announcing their intention to build and operate a line about 11 miles in length through the same territory. The chances in favor of the latter company are somewhat the best, as their petition will come before the railroad commissioners, and they can probably get the authority they want within a few weeks, whereas the former company will be obliged to wait two months before their application is acted on by the legislature. The capital stock of the Dartmouth & Westport Street Railway Company is $100,000, and their board of directors is composed of J. H. McKenzie, South Dartmouth; H. A. Slocum, Dartmouth; Chas. Fisher and J. A. Macomber, Westport; F. W. Brightman, Fall River; J. W. Macomber and A. P. Smith, of New Bedford.

H. G. T.

Boston, January 7.

ITEMS OF INTEREST.

Mischievous boys in Far Rockaway, equipped with Flobert rifles, have been making targets of the arc light globes that overhang the streets in that village. In a week more than 30 of the globes have been shattered. A watch is to be set in hope of catching the culprits.

The trolley system of the Jersey City and Bergen Railroad has been completed from the head of Montgomery street to the ferry in Jersey City, and a test of the cars shows that they work satisfactorily. President Thurston has announced that the use of horses would be discontinued and the trolley cars adopted on that line Thursday of this week.

Williamsburgh, L. I., is to have a new trolley road, to be known as the Twenty-third Street Ferry and Newtown Railroad. Cars will run from the foot of Broadway to Driggs avenue to South Fifth street, to Montrose avenue, to Bushwick avenue, and thence through various streets to Wyckoff avenue and to the rear entrance of Cypress Hills Cemetery. The road will be six miles long. The capital stock is $750,000, divided into 7,500 shares. The directors of the company are Moses May, John G. Jenkins, Peter Wyckoff, John J. Cooney, H. B. Scharmann, Theodore F. Jackson, John E. Van Nostrand, Frank Jenkins and Marshall S. Driggs.

The Children Are Catching On.

The Shultz Belting Company, of St. Louis, Mo., had an exhibit and manufactured belting at the St. Louis Exposition, and the following incident is the result of a visit to that institution by one of the pupils of the Divoll school.

A few days ago a teacher in the Divoll kindergarten was giving her pupils a little instruction in astronomy and the movements of the planets in the solar system, and said to a little boy:

"Johnnie, what causes the earth and moon to spin on their axes like a top as they do?"

"That there strap," answered Johnnie.

"What strap? What do you mean?" inquired the mystified teacher.

"Why," said Johnnie, "I seen, on one of them picture cards down at the Exposition, of that company what had that machine what chops pieces of leather up into little squares, a picture of a strap running around the earth and moon, making them spin around like a top."

Changes in Prominent Advertising Agencies.

Mr. Lyman D. Morse, who for several years has been the manager of J. H. Bates' Advertising Agency, 38 Park Row, New York, has become a partner with Mr. Bates, and the firm will hereafter be known as the Bates & Morse Advertising Agency. This is a change which will undoubtedly act for the good of both publishers and advertisers, to whom Mr. Morse is well and favorably known.

Mr. John J. Kiernan has retired from the firm of Frank, Kiernan & Company, general advertising agents, 152 Broadway, New York, and the business will be continued by the remaining partners, Albert Frank and James Rascovar, under the title of Albert Frank & Company.

The attention of our readers is called to the announcement of the ELECTRICAL REVIEW which appears on the inside front cover of this issue.

More Lamp Suits.

[*Special from our Boston Correspondent.*]

The case of the Edison Electric Light Company and the Edison General Electric Company *vs.* the Perkins Electric Lamp Company came up for hearing on Friday, January 6, before Judge Shipman in the United States Circuit Court at Hartford, Conn. Both parties to the suit were of the opinion that this was but a preliminary hearing, but Judge Shipman took peremptory action and granted the injunction asked for by the plaintiffs without listening to any argument. As a consequence, the Perkins Company are closed up completely, and your correspondent has positive information that the same action will be taken with several other New England manufacturers next week. Papers are already drawn up, and will be served on them at once.

This last action of Judge Shipman puts a different phase on the matter, and it is one which the lamp trade in general do not contemplate with any great amount of pleasure.

Next week will undoubtedly be an eventful one in lamp circles, and it looks now as though it was merely a question of who comes next.

H. G. T.

Boston, Jan. 7.

PERSONAL.

Mr. Thomas A. Edison was recently in Akron, O., visiting his father-in-law, Mr. Lewis Miller.

Mr. J. C. Gilchrist, of Vermillion, O., has been elected president of the new Sandusky, Milan and Huron Electric Railroad Company.

Prof. F. B. Badt, of the General Electric Company, is on his way to Great Falls, Mont., to start the Boston and Montana electrolytic plant.

William B. Turner, superintendent of the Schenectady works of the General Electric Company, resigned on January 1 to engage in the machinery business at Schenectady.

Mr. D. W. Cooke has been appointed assistant general passenger and ticket agent of the Chicago Great Western Railway Company, with office at Chicago. His appointment was effective January 1, 1893.

Mrs. Martha J. Lamb, editor of the *Magazine of American History*, died in New York city last week. She had made a special study of electricity and had written many articles of merit on electrical subjects.

The new Traders' National Bank, of Lowell, Mass., has just moved into new and elegant quarters. Mr. Charles J. Glidden, secretary and treasurer of the Erie Telegraph and Telephone Company, is president of the bank.

Mr. H. M. Littell, who has been general manager of the Mount Auburn Inclined Plane and Street Railway Company, of Cincinnati, for four years, has resigned to accept a similar position with the New Orleans Traction Company.

Mr. F. W. Best, formerly with F. W. Best & Company, Denver, Colo., has been appointed Eastern representative of the new monthly magazine, *World's Fair Electrical Engineering*, with headquarters in the *Tribune* building, New York city.

Mr. Edward B. McClees has again become a member of the staff of the Kerite Company, with headquarters in New York. Mr. McClees possesses a very wide acquaintance in electrical circles, and will be warmly welcomed by the many friends of the Kerite Company.

Mr. W. B. Cleveland has opened an office in the Hollenden Hotel Building, Cleveland, O., as an electrical engineer. Mr. Cleveland will practice his profession in addition to retaining the business of the Forest City Electric Works at Geneva, O., of which he is the proprietor.

Mr. George D. Burton, president of the Electrical Forging Company, of Boston, has accepted the invitation of the Franklin Institute, of Philadelphia, Pa., to deliver a lecture at the regular meeting of the Institute, January 18, 1893, on his system of working metals by electricity.

LETTERS FROM A LABORATORY.—XXIX.

BY JULIAN A. MOSES.

Where it is desired to use the camera simply as an adjunct to the note-book, it is best to purchase a lens that is as near perfectly "rectilinear" as possible. It is not absolutely necessary to have one that is absolutely "achromatic," for it is not so much the color value, as the correct form that is desired. Manufacturers of photographic apparatus publish books descriptive of their wares, and in many of these will be found advice regarding the special form best adapted to your use. However, what is known as a "view" lens will never do for accurate work. It distorts the image towards the edges of the plate.

The employment of a lens of this character once caused a great deal of trouble. A young photographer was employed to take a picture of a power house of a certain electric company. The city officials declared that the construction of the building was imperfect, and that the walls had bulged. In some way the matter got into the courts, and a photograph was required to show the jury the condition of the walls. It appeared that the photographer had taken the picture with a lens that distorted the curve in such a manner that the walls, which were really bulging, appeared straight. Upon this warped evidence, the jury brought in a verdict to the effect that, "the walls were not guilty of bulging as shown by the evidence." This is not an exceptional case and it is, therefore, advisable to be sure that your lens will not distort your drawings or whatever you wish a correct photograph of.

A good supply of water must be continually at hand, for water is the chief tool of the photographer. There must be no cracks in the walls or in the doors of the room, for any rays of white light that enter are so many stumbling blocks in the path of success. Many operators are careless in this respect, and very often attribute their poor work to other causes, whereas, in reality, their failures are due to their lack of attention to this detail. As regards the internal source of illumination, there is nothing better than a ruby-colored incandescent lamp of not more than 16 candle-power. It should be encased in a bag of yellow tissue paper to exclude all of the unnecessary light. In my dark room I have an incandescent lamp thus protected, which hangs over the wash-basin, and is attached to the wall by wires, so that it can be placed in any desired position, and thus make it suit the exigencies of particular cases. The advantages of the electric light over any other source of illumination in the dark room are numerous. The heated and kerosene-impregnated atmosphere, well known to the operator, are entirely done away with by the use of the electric light, and the air thus kept sweet and wholesome. There is absolutely no danger of fire from its use, while in many of the dark rooms, where the operators are confined nearly all day, special chimneys must be built to prevent the vitiating of the atmosphere, and enable the work to be done with any degree of comfort. Where an electric light circuit is available there can be no excuse for not employing it, and even where the current is not at hand, storage batteries may be used. Be careful to keep them away from the dark room and from the plates, for it has been found that the hydrogen of the batteries is in a measure deleterious to the quick working of the plate, and in one case it has been known to completely spoil a box of them that had been placed over a number of working batteries. If much work is being done, it will pay in the end to have the batteries charged at a neighboring power house. Another great advantage of the electric light over the kerosene lamp in the dark room is that it can be put out at any moment, and the development allowed to proceed in the dark. Where the room to be lighted is well constructed, the electric light may be made a fixture, and placed in a box provided with colored tissue papers, immediately over the developing tray.

An Electric Mine Pumping Plant.

An excellent example of the manner in which electricity is displacing steam in the mining industry is given by the recent installation in the William H. colliery of the Connell Coal Company, located in Duryea, Pa. This colliery is considered one of the most important mines in its district, the average daily output being about 1,200 tons. Many improvements have been made in the plant which will enable the mine to turn out from 1,400 to 1,500 tons per day.

The feature of greatest interest in the improved plant is the electric pump. This is the first electric pump introduced in the mines of that section, and its successful operation is being watched with great interest by all interested in mining matters. The pump is of the horizontal, triplex or

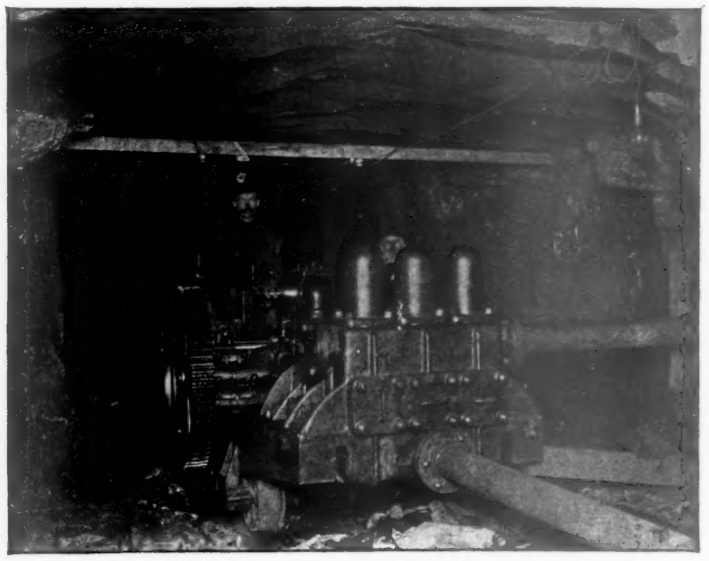


FIG. 1.—AN ELECTRIC MINE PUMPING PLANT.

three plunger style with six and one-half inch plungers and eight-inch stroke. It makes 42 revolutions per minute, and, in its present location, throws a steady, solid stream of water through a four-inch pipe a distance of 500 feet from the lower workings to the main pump. The capacity of the pump is 500 gallons per minute. Its entire weight, inclusive of the operating motor, is 6,600 pounds. The electric motor is a seven and one-half horse-power General Electric Company motor, and the generator, constructed by the same company, and located in the main engine house on the surface, is of 10 horse-power. The power is transmitted to the motor over copper wires running down through the air shaft and along the roof of the mine for a distance of 1,700 feet. The pump and motor are mounted upon a wheeled truck and can thus readily be transported to any point in the workings. This quality alone is a strong recommendation to mine managers. The claim of the General Electric Company that the electric pump needed considerably less attention than the steam pump has been heartily admitted by the managers of the colliery.

By the use of the electric pump a great danger in this mine has been obviated. The steam from the steam pump formerly used penetrated the roof of the mine in its vicinity, loosening the rock and rendering the possibility of its fall always imminent.

Besides furnishing power for the pump, the electric generator on the surface supplies current to the incandescent lamps, which light the engine houses, the head of the shaft, the inside pump house, and the workings about the foot of the main shaft. The contrast between the incandescent lamps attached to the roof along the main gangway and the illumination sparsely distributed from the miner's lamp, is most striking.

If after a few month's trial of the new system of lighting and pumping it is pronounced successful, the colliery company intend still further to utilize electricity in their mine, and put it to other uses, such as to operate drills and locomotives. It greatly surpasses steam or compressed air for the operation of drills, or mule, rope, or steam haulage for that of locomotives.

The electric period in coal mining is fast advancing, and mine managers and owners of a progressive nature recognizing this are vigilantly watching new developments in this direction.

American Institute of Electrical Engineers.

The seventy-third meeting will be held at the headquarters of the Institute, 12 West Thirty-first street, Tuesday, January 17, at 8 P. M. The paper to be presented is entitled: "Electrical Recording Meters," by Mr. Caryl D. Haskins, manager of the meter department, General Electric Company, Boston, Mass.

Beginning with this meeting the new arrangement for the publication of papers goes into effect, by which the advance copies, usually printed for the use of those in attendance, will be made the regular mail edition of the Transactions, and it is the intention that they shall reach the membership on or before the date of the meeting. Owing to the frequent delay of printed matter in the New York Post Office, those who may wish to participate in the discussion are advised to have a copy mailed at first-class rate, which will be done upon application to the secretary. Members attending are requested to bring their copies with them. The council will meet in the secretary's office at five o'clock.

New York Electrical Society.

The one hundred and fiftieth meeting of the Society will take place on Wednesday, January 11, 1893, at 8 P. M., at Columbia College, Madison avenue and Forty-ninth street. Mr. Augustus Noll, general superintendent of the New York Electric Equipment Company, will give "A Practical Talk on the Installation of Isolated Electric Lighting Plants," of which the following is a brief synopsis:

1. Determination of size of unit for dynamo and engine.
2. The location of dynamo and engine.
3. The construction and connection of switchboards.
4. Different systems of wiring: (*a*) Feeder system. (*b*) Feeder and main to central points. (*c*) The crib system.
5. General remarks on wiring, location of lamps, switches, etc.
6. Special installations: Theatres, breweries, public institutions, etc.

The lecturer will also illustrate the method of calculating the size of conductors required by working out an actual example.

Pittsburgh Electric Club.

The Pittsburgh Electric Club celebrated the passing of the old year by entertaining the Pittsburgh Press Club. A pleasant musical programme, interspersed with recitations, was an enjoyable feature of the evening.

Canadian Electrical Association.

The second convention of the Canadian Electrical Association will be held in the School of Practical Science, at Toronto, Ont., on Wednesday and Thursday, January 25 and 26, 1893.

LITERARY.

"Transactions of the Canadian Institute for December, 1892," have been received.

"Coal," by E. W. Parker, is the title of an interesting pamphlet sent out by the United States Geological Survey.

We have received from the Navy Department the "Annual Report of the Chief of the Bureau of Steam Engineering for the year 1892."

The Mathews-Northrup Company, of Buffalo, have sent us a very beautiful set of proofs from their complete art printing works. The price of the proofs is one dollar.

"How to Make a One Horse Power Motor or Dynamo," by A. E. Watson; 50 pages; 25 illustrations; price, 25 cents. Sent postpaid on receipt of price by the ELECTRICAL REVIEW, 13 Park Row, New York. This little book will afford the amateur electrician the means of testing his ingenuity and skill in the practical construction of electrical apparatus. The instructions are very complete, and are assisted by numerous well prepared working drawings.

The proceedings of the Fourteenth Convention of the National Electric Light Association, held at Montreal, September 7, 8, 9 and 10, 1891, have been issued by Secretary George F. Porter. They form a volume of nearly 400 pages, handsomely printed and bound by the James Kempster Printing Company, of this city. The frontispiece is a half-tone portrait of President Charles R. Huntley, which was loaned to the Association by the ELECTRICAL REVIEW. The proceedings are very interesting, and in their present elegant form are a suitable and valuable addition to any electrical library.

St. Louis Electric Club.

The St. Louis Electric Club has completed its organization and began the new year with 90 members. It is expected that this number will be largely increased in the near future. Splendidly located rooms on the second floor of the Equitable Building, Sixth and Locust streets, has been secured.

FIG. 2.—ANOTHER VIEW OF ELECTRIC MINE PUMPING PLANT.

A corner room, 60x40, has been elegantly furnished as a general lounging, reading and reception room. It is lighted with incandescent lamps and steam heated. Another apartment will be fitted up in a short time as a billiard and smoking room. The facilities already provided will be ample for the proper entertainment of the delegates to the convention of the National Electric Light Association next month.

Montreal Electric Club.

The Montreal Electric Club was organized on December 12. Messrs. E. Craig, A. Morgan and L. Granell were appointed a committee on constitution and by-laws. Mr. W. B. Shaw was appointed president; Mr. J. A. Farlinger, vice-president, and Mr. J. Burnett, secretary-treasurer.

GENERAL NOTES.

The electric street railway between Sharon and Sharpsville, Pa., is about completed.

The electric car is literally astonishing the natives of Singapore, India. They call it the wind carriage.

A charter has been granted for building and conducting an electric railroad from Altoona to Tyrone, Pa.

The electric road between Salem and Lynn, Mass., is progressing rapidly, and will be completed at an early day.

Whitefield is to have an electric light plant, which is expected to be in full working order by the last of January or the first of February.

The Port Defiance, Tacoma and Edison Railway has a telephone system by which the motorman can talk to the main office in case of accident or delay on the line.

The trolley ordinance pending in the Reading, Pa., councils for a year, allowing the City Passenger Railway Company to substitute electric propulsion for horse power in the moving of its cars, has passed the Select branch with but one vote against it.

A "screecher" whistle will be attached to the boiler at the electric light station in Chatham and be blown each day five minutes before starting the dynamos to warn linemen who may be at work of the approach of the electric current. The whistle is guaranteed to be heard 15 miles.

The site is being prepared for the new buildings to be erected on Yorkville avenue by the Toronto Street Railway Company. The work of erection will be commenced in the spring. The Toronto Street Railway Company have stated their intention of having all the lines operated by electricity next year.

An enthusiastic meeting was held in Auburn, Me., recently, in the interests of the proposed electric railroads to Mechanic Falls and Turner. The following gentlemen were appointed a committee to take preliminary action in the premises: J. R. Learned, B. F. Briggs, H. Wesley Hutchins, Ara Cushman and Geo. G. Gifford.

The Brooklyn City Railroad Company and the Kings County Electric Railroad Company, which was organized a few months ago, are competitors for a valuable franchise for lines within and beyond the city limits, and the application of each is before the board of aldermen. The City Company has offered the city $250,000 for the franchise, but the Electric Company wants it for nothing. Both companies have applied to the town board in Flatlands, and last week it decided in favor of the Electric Company. It is expected that the Brooklyn Aldermen will do the same thing, and, in that event, Lawyer William J. Gaynor may bring a suit to set it aside.

ELECTRICAL PATENTS WORTH NOTING.

Long Distance Telephony and Telegraphy.

A number of interesting electrical patents have been recently issued, among which is one granted to Stephen D. Field, for a system by which electrical vibrations or undulations, such as are utilizable in telephony or telegraphy, may be relayed in a way to increase the distance by which intelligible intercommunication may be held. In this system the relay, whether located at an intermediate point or at one of the transmitting stations, has the function of originating undulations of great rapidity, which are thrown upon line in both directions when the instrument is located at an intermediate station, and intercommunication is established by damping these undulations at one of the terminal stations. For example, in the accompanying diagram is represented an instrument which throws rapid vibrations upon two lines, one running east and the other running west. This apparatus comprises a diaphragm A, mounted upon a metal box, and insulated therefrom, closed at all points except at the top, where a tube B leads to an exhaust apparatus. A valve or stop-cock G, containing some substance, such as cotton waste, which will filter the air which enters the box, is mounted in one side. The air suction rarifies the air within the box, causing the diaphragm A to be forced inwardly by atmospheric pressure and stop the mouth of the tube. The stop-cock permits sufficient leakage to restore

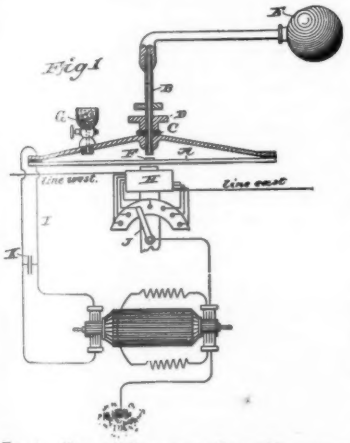


FIG. 1.—FIELD'S SYSTEM OF LONG DISTANCE TELEPHONY AND TELEGRAPHY.

the equilibrium and there results an exceedingly rapid vibration of the diaphragm. The diaphragm and the walls of the box are connected in a local circuit supplied with current by a dynamo-electric machine, and the exceedingly rapid vibrations of the diaphragm induced by the organization already described, varies the resistance of this circuit between a contact anvil F and the top of the tube B, which is formed of metal. The armature of the dynamo-electric machine is provided with two windings, one of which is a low tension winding used to supply the local circuit just referred to, and the other of which is a high tension winding discharging through two pairs of independent brushes to earth and to the lines in both directions. The diaphragm vibrates in close relation to a permanent magnet over which is a spool of wire tapped at a number of intermediate points of its convolutions, the taps running to a set of contact spots over which sweeps a switch arm J. By the adjustment of the switch the two lines east and west may be balanced so that the differential effect of the dynamo current will be zero on the magnet. The rapid vibrations of the diaphragm react upon the two lines and keep them in a state of intense vibratory electrical action. At the terminal of either line may be located any signaling instruments, whether telegraphic or telephonic. If the latter are used, a transmitter may be supposed to be located at one end of the line and a receiver at the other. The fluctuations induced by the vibration of the diaphragm are so rapid as to be inaudible to the human ear. If, now, the diaphragm of the transmitter at one of the terminal stations is actuated by voice waves, the degree of electrical stress in the line is varied in exact proportion to the strength of these waves, and they damp or re-enforce the waves upon line, which, passing through the coils of the magnet H at the intermediate station, react inductively upon the other

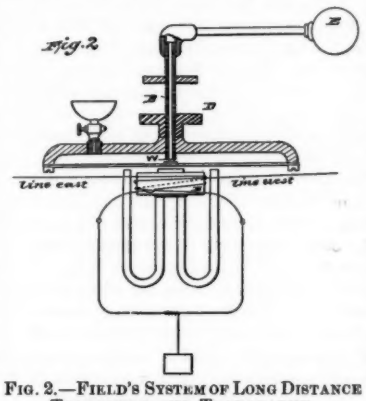
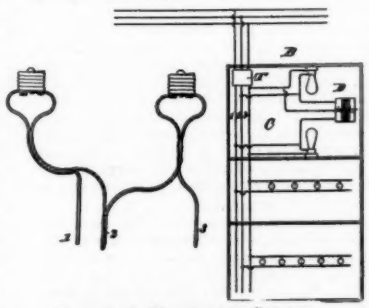


FIG. 2.—FIELD'S SYSTEM OF LONG DISTANCE TELEPHONY AND TELEGRAPHY.

line and are reproduced at the receiving station of that line. The dynamo may in some cases be dispensed with and the diaphragm caused to vibrate in an intense magnetic field produced by a multipolar permanent magnet. Such an organization is illustrated in Fig. 2. It will thus be noted that the two circuits are placed in inductive relation at the intermediate station, or if the relay instrument is located at one of the two communicating stations this inductive relation will exist at one of them. The lines are at all times when the apparatus is in use in a state of electrical stress, and the signals are established by variations in degree of this stress, thus rendering the apparatus highly sensitive and giving it efficiency at long range.

Operating Polyphase Alternating Current Motors.

Another patent of interest is one for wiring a building in a polyphase alternating current system, or in any local distributing plant, whereby polyphase alternating current motors may be supplied in any room of the building and an economy of wiring realized. This system permits of the use of a single transformer for supplying both lighting and motor systems of a distributing plant, the triphase or polyphase currents being converted into low tension currents, and permuted in a plurality of lamp circuits in such a way that a group of wires representing all the differential currents of the polyphase system will lie within close or accessible range of each other, so that they may be conveniently connected with



BRADLEY'S POLYPHASE SYSTEM.

the terminals of a motor and the latter operated at its best efficiency. This system was patented by Charles S. Bradley, and is illustrated in the accompanying engraving. The system represented is a triphase system, in which the current waves follow one another at intervals of 120 degrees. This passes into a rotary current transformer by which the tension of the line currents is lowered, and the three low tension wires from the transformer are carried through the building, and the lamp circuits in adjoining rooms are tapped from different wires, or the several lamp brackets of the same room may be tapped from different wires. For example, in the room illustrated in the drawing, at C the lamp or group of lamps is tapped from wires 2 and 3, and another group of lamps is tapped from wires 1 and 3. Thus the two brackets render accessible three wires of the system, and a triphase motor, represented at D, may have its three leads connected with two brackets, so that it draws three currents differing in phase by 120 degrees. Two ordinary screw plugs may be used and inserted in the lamp sockets, and the four terminals grouped as shown in the detached view, the two wires which are at the same potential being connected together as shown at the reference Fig. 3. This system lends itself to any three-wire system already installed in a house or plant, it being only necessary to make the connections at the transformer so as to deliver on the three leads the three alternating currents, and to connect the plugs supplying the motors with two lamp sockets connecting with the three leads. A simple test to insure a proper connection between the plugs and sockets, so that the wires 1, 2, 3, leading from the plugs, will deliver currents properly differing in phase, is by connecting an incandescent lamp across the pairs of terminals successively, and the pair which fails to render the lamp incandescent is of the same potential, and should be connected together as indicated at 2 in the detached view.

Electro-Diagnosis.

(From the London *Electrical Review.*)

A preliminary account of Dr. Dawson Turner's research on electro-diagnosis by means of the urine was laid before the Royal Society, Edinburgh, in December last, and a paper now before us, based upon a more extended series of experiments, is a further contribution to the same subject.

The object of the inquiry was to ascertain the electrical resistance of various kinds of urine both in a state of health and disease. The measurements were made by means of a Wheatstone's bridge with alternating currents and a telephone, according to Kohlrausch's method, and at a temperature of 65 degrees Fahrenheit. The resistance could also be estimated, though less accurately, by the current from a few Daniell cells, a galvanometer, and an application of Ohm's law. The first 70 experiments were made by this method. It would appear from the observations, some 500 in number, that the specific resistance of a normal urine amounts to about 45 ohms, and that it varies as a rule inversely with the specific gravity. The latter is a measure of the amount of solids in solution, and particularly of the urea. It might be supposed, then, that the resistance depends also mainly upon the amount of urea; this, however, is not the case. A number of experiments were made with artificial solutions of urea, sodium, chloride, phosphates, sugar, etc., in distilled water, and from these it is clearly apparent that the electrical resistance depends almost wholly upon the salts, chlorides, phosphates, sulphates, etc., and that it is only when these are absent or diminished that the influence of the urea makes itself felt. The resistance is, therefore, a measure of the chemically active substances in urine, of the salts, and to a very much less degree of the inert urea. This gives us a simple and rapid method of estimating the constitution of a urine as regards its salts, while the specific gravity, in the absence of sugar, is a guide to its urea. In a normal urine, these go more or less inversely together; given the specific gravity and the resistance can be estimated, and given the resistance and the specific gravity can be calculated.

In diseased conditions there are certain exceptions to this rule—"That the resistance varies inversely with the specific gravity," which can be arranged accordingly as they occur in acute or chronic diseases. Excluding acute infectious diseases and local surgical affections, the two most prominent exceptions are—amongst the former, acute croupous pneumonia; amongst the latter, diabetes mellitus.

That the urine of a case of pneumonia should offer a higher electrical resistance than would be predicted from its specific gravity is easily understood when the great diminution of the chlorides in the urine of a case of this disease is remembered; but the increased resistance of a diabetic urine affords a question of a more interesting nature. In this disease the specific gravity of the urine is high, and the electrical resistance offered by it is also high, and sometimes very high. Thus the specific gravity may be considerably above 1,030, and the resistance at the same time as much as 150 ohms, while the resistance of an ordinary urine of a specific gravity of 1,030 would probably be below 40 ohms.

Upon what does this increased resistance depend, to a diminution in the salts, or to the presence of the sugar? Almost wholly to the former. A 1 per cent. solution of sodium chloride has a resistance of 59.5 ohms, and the addition of 10 per cent. of grape sugar only raises the resistance to 68 ohms; a 2 per cent. solution of sodium chloride has a resistance of 29.25 ohms, and the addition of 20 per cent. of sugar raises it to 51 ohms, and of 30 per cent. of sugar to 63.75 ohms. With smaller percentages of sugar there may be scarcely any effect.

It cannot, therefore, be doubted that the sugar, probably hindering diffusion by its viscosity, does to a slight extent raise the resistance of a saline solution. (It will lower the resistance of distilled water when by itself.) But by far the greater part of the increased resistance of a diabetic urine is due to the relatively great diminution in the salts, and it is to the credit of the electrical testing that this fact is brought so prominently forward. It will be found, further, that this resistance usually diminishes with the amount of sugar passed, and that it may be utilized as a test of the patient's progress. Whenever we find a high specific gravity together with a high electrical resistance (above 80 ohms specific resistance), we may suspect the presence of sugar. The specific gravity is raised by the sugar, and the resistance is increased by the diminution of the salts.

In acute and chronic Bright's disease the resistance is high, also usually in chronic bronchitis, phthisis, mitral disease and anæmia, particularly pernicious anæmia. The effect of diet has to be considered. Copious draughts of water increase the resistance. Taking much salted food diminishes it, etc. The urine passed in the early morning if a late dinner or supper is eaten, commonly has a relatively low resistance.

By this means, then, we are enabled to make an immediate rough estimation of the constitution of the urine, and particularly of its salts, chlorides, phosphates, sulphates, etc.; a result which could only otherwise be arrived at by a tedious chemical analysis. The specific gravity of a urine depends (in the absence of sugar) mainly upon the urea; the electrical resistance upon the salts; by combining these we can at once form a fair idea of a urine's constitution, and of the efficiency of the kidneys.

So far as the condition of the urine reflects a patient's condition, one of the best gauges of it is the electrical resistance; and more than that, even in other conditions, when the kidneys were supposed to be quite unaffected, as in the case of pernicious anæmia, the electrical resistance will usually closely follow any changes in the patient's condition, changes sometimes of so slight a nature that they would otherwise almost escape notice. The urine to be examined should be fresh, and should be a specimen taken from the whole amount passed in the twenty-four hours. The resistance diminishes as the urine is kept from fermentation changes. This method of examining the urine is completely in its infancy, and much may be expected from its further development. Not that it is intended that it will in any way replace the ordinary methods of examination; it is an adjunct to them, and one apparently of much promise, that can be very rapidly carried out, but whose precise value has yet to be determined.

Whatever this may prove to be, Dr. Dawson Turner deserves the warmest thanks of the medical profession for introducing electro-diagnosis in the manner shown, and we may hope that the day is not very far distant when diabetes and kindred complaints may perhaps be treated electrolytically as a means of diminishing the excess of sugar and albumen developed by sufferers from these distressing and generally incurable complaints.

MEDICAL ELECTRICITY.

EDITED BY DR. J. MOUNT BLEYER, NEW YORK.

An Attempt at the Solution of a Few Electro-Physiological Conundrums.

If Faraday were to come back from "the land from which no traveler ever returned" he would have to learn the A B C of modern electricity, such have been the strides of this science, as the enormous currents which we are now making use of were, of course, then practically unknown. But, while electricity has been making higher jumps than any physical science, the so-called medical electricity (I abominate the term, for there is no such a thing; but I mean electricity as applied to physiology; and, therefore, to a certain extent to therapeutical pursuits and ends) has marvelously hung back, and it is certainly still in the ante-Faradaic period. But the mist is lifting fast from us, and the doctor of 1893 begins to pierce into it. For this I have given several reasons. One is in the syllabus, that the knowledge of physics and the knowledge of physiology is rarely united, and is, to a certain extent, incongruous; I might even say antagonistic. The mind of the physiologist is not the mind of the physicist, and there is occasionally a little heating from the friction arising between them.

There is another reason for it. It is a good thing for the world at large—it is a good thing for science at large—when one genius comes and occupies a field. He does all the work that can be required. He settles the induction, as Faraday used to say, and then he leaves the rest to the computers. So electricity had its pioneer in Faraday. But as it sometimes happens, a man is too big for his position, and we had in physiology one of those men—Duchenne—whose discoveries and genius were not discovered until the present time. This work was not electrical, but physiological. With a very rough induction coil this energetic man of science trotted about in Paris hospitals examining all the patients with this curious coil of his. It excited the muscles, and by testing patiently and carefully for years a number of muscles individually with small pointed conductors by means of his induction coil, which was practically only an irritator, only an electric needle which he stuck in those muscles, he accomplished a great work. Through this medium he isolated two or three distinct diseases not known before, but well marked now. That old-fashioned coil has been the means of what has been termed electric testing in physiological work.

This age gives us new coils, and these are very complicated, a very uncertain and a perfectly unmeasured source of force.

It has not made known to us, the least in the world, what it is doing. We know that it tickles up the muscles into activity, and we know that if they do not respond naturally, it is an indication of some pathological change in the human body. But that is not electrical; it has thus been surnamed electrical, without it being so. As to electricity, pure and simple, I am sorry to be forced to state, that a large part of the medical world still shows evidence of being behind hand.

I quote the following erroneous conclusions as found written by a scientist in a prominent journal:

"Far less was it known; indeed, it is only now beginning to be understood that man himself is a magnet; that his blood and every tissue of his body is pervaded by magnetic influence; that he may be acted upon magnetically by magnets; that in some persons the magnetism disengaged by the contraction of the muscles is sufficient to deflect the needle of the compass (magnetism—mind not electricity)"; "that the health and comfort of each individual, his physical vigor and mental power, depend largely on his magnetic condition and his relation to the magnetic forces around him." These statements are proven to be false, if we simply put this question and prove it practically: If we have to deal with a galvanometer, if we even walked into a room, being magnets, what would become of the galvanometer?

A FEW OF THE ERRORS MADE AND SOLVED REGARDING POWERFUL CURRENTS, AND THE PROPER METHOD TO BE USED IN OBTAINING THE MEASUREMENT OF RESISTANCE OF THE HUMAN BODY, ETC.

There seems to be a vague idea that currents of high tension are painful and dangerous on account of their high potential, but that is a popular error which should be exploded. Some electricians believed that the human frame was precisely like a galvanometer, that the physiolgical influence of our electric current was lately proportionate to the quantity of electricity which actually passed through the body, and not at all to its tension. Of course, high tension causes more electricity to pass through the body.

Chief among common errors is imperfect contact. Any person accustomed to electric measurements will see immediately that the very hopeless statement that the body varies from 500 to 100,000 ohms must be a question of contact—it cannot be anything else. If this would be turned into current or potential, see what would happen to the test patient if, during the experiment, his resistance should vary from 100,000 ohms down to 500—the man would simply be burnt up. We can thus see that the differences experienced in the early days of medico-electricity have been, that the contacts were to a degree imperfect that the experimenters and all persons concerned did not in the least suspect. We know that skin when dry is a most perfect insulator. We are living in an epidermis of gutta percha; we are small walking cables, and like cables, we certainly can be charged.

The way to avoid such accidents of boiling a subject alive during any experiments of taking the measurement of resistance is simply by making good conductors.

The method of obtaining the resistance of the human body is not from hand to foot, from foot to foot, from hand to hand; this would otherwise include a large portion of the body without any attempt to localize the resistance of the different parts. If the resistance is thus obtained as first stated, it will vary from time to time, and supposing, for an example, the resistance is measured from hand to foot, he is unable to say whether the change is due to an alteration of resistance that has occurred throughout, or only in the arm, or in the trunk, or in the leg.

I believe we ought to strive in preserving the resistance of the human body. We must aim at a local resistance rather than that offered by a large extent of the body, because by so doing a more useful knowledge is obtained, as the resistance of a diseased limb not only differs from what it would be in health, but under certain circumstances the local alternation of the resistance would enable us to give a more certain prognosis than we could have given without. Dr. Kilner, of London, has adopted this method of obtaining the local resistance. He places the two electrodes at a convenient distance apart and measures the current by means of a vertical mirror galvanometer as quickly as possible, and then places the electrodes at exactly half the distance apart, and again measures the current, using the same battery. From this, if the area of the electrodes be known, not only can the resistance of the epidermis, but also that offered by the subjacent tissues between the two electrodes be calculated. Another advantage accrues: That as the resistance is altered after the passage of the current from what it was previously, the state of contraction of the local blood vessels can be determined, because the current dilates them, and as the blood is the best conductor of the animal tissues, the resistance will decrease in direct proportion to the increase of the amount of blood to the part.

Electrical engineers tell us that it is not so important to know the total resistance of the body as the proportion between the resistance of the different parts, the different organs, etc. It seems accordingly that no result approaching perfection will be obtained until those applying electricity to the human or any other animal body are in a position to map out the several branch electric circuits which are formed by the different substances to be found in any portion of the body through which a current may be passed, just as an electric light or telephone engineer would plan out his circuits of wires, lamps, etc., and observe the effect of the different branches, one on the other. It would follow then, to my mind, provided the relative conductivity of each substance be established, since the dimensions, form, etc., of each ligament, etc., should be well known, the planning of the animal circuits, if I may use this term, should present no very great difficulties.

Another point now to cover is what effect the electric current has upon the body. I believe we must have three results at least. The first, electrolysis of the blood and other fluids, and as a result of the electrolysis, we shall have a development of oxygen at the anode or entering pole, and of hydrogen at the cathode. I call attention to this point and as to what will be the effect of the generation of these gases at different points.

We must also take into consideration whether these gases are developed only on the surface of the body, or whether, owing to its peculiar conformation, minor electrodes may not be set up internally, where the gases may be set free in smaller quantities, and what would be the effect on different organs, by the development of such gases in their midst. We must, also, I believe, have heat developed, since the current meets with resistance in its passage, and it also appears to me that this generation of heat may possibly be the explanation of the deaths that have occurred all over the world where high tension electric light currents are employed, which are not traceable to simple shock or stoppage of the heart's action. There is no doubt that a vital organ is fatally injured by the passage of an excessive current through it and the consequent generation of heat in it.

Another point that has often led up to a disputation is that we find a difference in the resistance, measured with every change in the electromotive force (E. M. F.) of the testing battery. From observation, I must say we could find the same variation if the resistance was measured after the current has been passing through the body for some time.

Another fact cannot hardly be accepted: That the electrical resistance really does change, unless some physical change has previously taken place. We know of no other case in which a body varies its resistance, without a physical change having occurred, and know no reason, at present, why the body should differ in this respect from other substances.

As a matter of suggestion, I would say the change may be due to the action of the current developing heat in the tissues; electrolyzing the liquids contained in the tissues; and possibly that a third property, which has not yet been mentioned, viz., electrical endosmose, may also, by altering the position of the liquids relatively to the tissues, effect the same result.

This property just mentioned, I believe, contains many of the most important functions of the human body, many of the secretions, and a large portion of the process by which the different organs receive their nourishment from the blood is effected by the circulation of these liquids through delicate membranes; and it appears to me that the mere passage of an electric current must materially assist this action, provided it pass in the right direction.

Another important matter to be taken into consideration is, what effect an excess of current might have upon some of the delicate membranes which perform these functions, and how far electrolysis effected the process. This is a grave question still to be solved; it is as important as it is grave. It certainly appears to me that this is a matter well worthy the careful study of electro-therapeutists.

ACTION OF THE ELECTRIC CURRENT PASSING THROUGH THE BODY.

This action is to excite the nerves, apparently; also, it has the property of restoring the lost vitality to a nerve. Dr. Althaus has given many instances of the restoration of overworked brains to their pristine vigor, by the application of a current of electricity.

What takes place in this case is an actual conversion of energy from the form of an electric current to the form, whatever it may be, that apparently resides in the brain, and controls the action of the body.

BLEYER.

The Advent of the Calendar.

And still they come!
By mail, express and
Boy, prepaid—all
Prepaid—but mostly
By mail.
The realms of Art
And caves of Genius
Have been searched
Until the avalanche
Of Beauty which has
Been evolved
Is overwhelming.
And nothing but dates!
Red dates, blue dates
And black dates.
If there were as many
Days as dates, each
Year would be an eon!
Would that it were so—
But these calendars.
Among the many, here
Is one from Cutter,
Of Chicago, George by name,
But not "by George," however.
Time takes he by the
Fetlock and doth
E'en produce a calendar
And blotter "two to oncet."
Like the blotter he
Is unto—an absorber,
Not of ink, but trade.
This Shakespearian style
Besults the cute de-
Sign (notice the "sign")
Embodied in his
Blot-calendar. So much
For Cutter.

The Pennsylvania Lamp
Is fitted to a shaft,
And a drifting Goddess,
Using the crescent moon
For bow, sends through
The inky night
A beam of light
Which 'lumes the clouds
From Philadelphia town
Even to Hohokus
And the Brooklyn wilds.
Let her shoot!

And now in softer tints
Of brown and blue,
Enlivened round with
Zodiac signs from
Janus to the Goat,
Comes forth from Providence
A calendar as is a calendar!
The goddesses of Music,
Art and Poetry are called
To aid in its construction.
And delicate as a
Summer wind, the
Hint is wafted to the eye
That wire, good wire,
All kinds of wire,
Are made and sold
By patriotic vendors,
Known to fame by
Their works—American
Electrical Works.
This one *is* a corker!

Wire we here, if not
To speak of wire?
In dizzy, dazzling design,
With lightning flash galore,
Comes Okonite from
Out Chicago.
The Western agent there
Is proud to put above
All dates this inter-
National product.
The name is Central
Electric Co.

A dusky Moore
Next claims our hold—
A symphony
In brown and gold.
Wire, more wire,
And of all sorts;
As useful, too,
For cots as courts.
From Quaker town
The message comes,
Where Penn looks down
On the city's homes.

This variegated verse
Will end. It had to be
Of several kinds,
Because, good reader,
Don't you see, the
Calendars were different—
Not all alike.

ADVANCE INFORMATION.

New Electric Companies Formed and Important Constructions Projected.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week:

New Electric Railways.

SALEM, ORE.—Geo. B. Markle, S. Z. Mitchell and E. P. McCormack have incorporated the Salem Consolidated Street Railway Company; capital, $500,000. The object is to operate all the lines in this city now under the control of the Capital City Railway Company.

NEWARK, N. J.—The Worcester Traction Company, capital, $5,000,000, has been incorporated to buy, sell, lease and operate street railroads by electricity or other methods. The incorporators are Edw. H. Dennison, Edw. J. Moore and C. Lord Stevens, of Philadelphia; S. E. Haas, of Chester, Pa.; and Thos. C. Barr, of Newark.

PHILADELPHIA, PA.—A syndicate, represented by James Rawle, treasurer of the J. G. Brill Car Company, has secured control of the Manayunk and Roxborough Inclined Plane and Railway, and will convert it into an electric trolley road.

BROOKLYN, N. Y.—The New York, Mapleton and Van Pelt Manor Electric Railroad Company has elected Andrew D. Baird, president; J. Lott Nostrand, vice-president; and Wm. P. Rae, secretary. Consents of property owners have been obtained, and construction is promised at an early day.

SHELBYVILLE, IND.—The Shelbyville Electric Street Railroad Company has contracted for the putting in of its plant, and work will be begun at once.

NEGAUNEE, MICH.—The Negaunee and and Ishpeming Street Railway and Electric Company has increased its capital from $120,000 to $150,000.

NIAGARA FALLS, N. Y.—W. Carrol Ely is securing right of way for an electric railway to be built from Buffalo to Niagara Falls.

SAN FRANCISCO, CAL.—The Fraley Electric Company; capital, $1,000,000. Incorporators, J. P. Jackson, J. B. Fargo and Geo. A. Ball.

LANCASTER, PA.—The Pennsylvania Street Railway Association has been organized with John A. Coyle, of Lancaster, first vice-president; John G. Holmes, Pittsburgh, second vice-president; L. B. Rhodes, Williamsport, secretary, and L. R. Reifsnyder, Altoona, treasurer.

PHILADELPHIA, PA.—The Frankford and Southwark Passenger Railway Company is preparing to introduce the trolley on its system, provided it can secure the consent of councils.

FREDERICK, MD.—M. Bosley is interested in a project to construct an electric railroad from Frederick to Hagerstown.

WINDSOR, ONT.—The electric street railway's power house was burned December 26.

COLUMBIA, PA.—Columbia and Washington Street Railway Company has been incorporated with a capital of $40,000. Incorporators, C. C. Kaufman, Wm. Hays Grier and H. C. Young.

TAUNTON, MASS.—The street railroad of this city will be made an electric road in the spring.

PHILADELPHIA, PA.—The Moyamensing and Penrose Ferry Road Passenger Railway Company, with a capital of $75,000, has been incorporated, and will be built at once.

HACKENSACK, N. J.—It is reported that the C. J. Field Engineering Company has been awarded the contract for building an electric road to run through Main street, Hackensack, to Fort Lee and Leonia.

PEKIN, ILL.—Wm. L. Prettyman is interested in a scheme to build an electric car line in this city.

PHILADELPHIA, PA.—The People's Passenger Railway Company will equip its Germantown line with electricity if it can secure the consent of councils.

NIAGARA FALLS, ONT.—The Provincial Legislature will be asked to grant a charter for a company to be known as the Ontario and Niagara Electric Railway and Power Company, with power to build an electric railroad from St. Catherines and Port Dalhousie to this town.

LEAVENWORTH, KAN.—The Leavenworth Railway Company; capital, $500,000. Incorporators, W. H. Stacy, Harry L. Earle, Leavenworth; F. W. Huidekoper, New York; H. L. Turner, Chicago.

WILMINGTON, DEL.—A trolley railway between Wilmington and New Castle is being agitated.

OAKLAND, CAL.—The Southern Pacific Railway Company is making arrangements to build a cross-town electric line in Oakland.

PHILADELPHIA, PA.—By a recent decision of the Supreme Court the Philadelphia Traction Company is authorized to use the electric trolley system on all its lines throughout the city.

AUBURN, ME.—At a meeting of citizens a committee was appointed to make preliminary arrangements for an electric line to Mechanic Falls and Turners.

NORRISTOWN, PA.—The Norristown Passenger Railway Company has accepted council's ordinance permitting trolley.

VALPARAISO, IND.—It is probable that the Hammond and East Chicago Electric Railway Company will build an electric line to Valparaiso, Laporte and Michigan City, at an outlay of $1,000,000.

DETROIT, MICH.—Negotiations for the purchase of the Highland Park Electric Railway are completed and the property will be transferred to the Detroit Suburban Railroad Company. The new purchasers will be obliged to spend about $100,000 in necessary improvements.

DENVER, COLO.—The Denver and Westminster Railway Company; capital, $1,000,000. Incorporators, D. R. C. Brown, of Aspen, Colo.; R. W. Woodbury, Mitchell Benedict and H. J. Mayham, of Denver. The company will build an electric railway connecting Westminster University with Denver.

ST. LOUIS, MO.—A syndicate composed of Western stockholders of the Chicago, Burlington and Quincy road, has purchased the street car lines of Alton. The whole system will be changed into electric lines and the power house will supply electric lights for the city.

KALAMAZOO, MICH.—The Kalamazoo City and County Street Railway has been sold, under order of the United States Circuit Court, to W. F. Davidson, as agent for the General Electric Company. The road will be equipped with electricity.

HOT SPRINGS, ARK.—Edward Hogaboon has let the contract for the first grading work on the electric railway to the Ouachita river, and work is to be begun at once.

NEWARK, N. J.—The Essex County Road Board has granted the Newark and South Orange Railway Company a franchise to run electric cars from the city line to South Orange.

Electric Light and Power.

MAINE.—It is proposed to consolidate the electric railroad and light interests of Maine. The coming legislature will be asked to grant a charter to the Maine Railway, Light and Power Company, with a proposed capital of $4,000,000.

MOBILE, ALA.—John Wilson, J. C. Lyle and others have applied for a charter for the Mobile Light and Railway Company, capital, $500,000, to construct and operate electric light and power plants and street railways.

BATH, ME.—A committee has been appointed to ascertain the expense of lighting other cities in the State by electricity, and it is probable that a municipal electric light plant will be established.

EAGLE PASS, TEX.—The power station of the Electric Light and Power Company was destroyed by fire December 29. The loss is put at $40,000.

NORWICH, CONN.—The Ponemah Mills Company has petitioned the legislature for right to utilize its power in the manufacture of electricity for light and power.

LINCOLN, NEB.—The Metropolitan Electric Lighting Company is the name of a new corporation that will ask the council for a franchise. C. H. Imhoff, J. H. McMurtry and K. K. Hayden are connected with the company.

CLEVELAND, O.—The Ohio Construction Company; capital, $10,000. Incorporators, Chas. W. Wason, R. M. Fuller, Paul B. Huyette and Howard L. Browning. The company will conduct a general mechanical and electrical business in the way of building and constructing electrical equipment for light, heat and power.

GIRARDVILLE, PA.—The Girardville Electric Company has been incorporated with a capital of $5,000.

BRANDON, VT.—Additional machinery will be placed in the Brandon Electric Light Company's plant.

NIAGARA FALLS, N. Y.—A syndicate has completed negotiations for the purchase of the controlling interest in the Niagara Falls Gas Light Company. The new company has announced its intention of putting in an Edison electric light plant.

NEWARK, N. J.—The Mason Electric Company; capital, $500,000. Incorporators, James H. Mason, of Brooklyn; Timothy S. Carman, Jonathan E. Van Doran and A. Frank Richardson. The company is incorporated for the purpose of manufacturing and selling electric instruments.

SACRAMENTO, CAL.—The Sacramento Electric Power and Light Company; capital, $1,500,000. Incorporators, Albert Gallatin, Andrew J. Ralston, Horatio P. Livermore, Charles E. Livermore and Joshua Baker. The objects of the corporation are to run and operate electric works for lighting, power and heating, and to operate a street railway in this city in accordance with a franchise heretofore granted.

EAST HADDAM, CONN.—The Salmon River Power Company has been organized in this city to develop and distribute water power and electric power. The capital is $50,000.

OLYMPIA, WASH.—Palouse Electric Light and Water Company, capital, $30,000.

WATERPORT, N. Y.—George Sprague, of Albion, has made a proposition to the town officials to build the abutments of the proposed new bridge, the town, in return, to give him the privilege to use the abutments as the end of a dam 20 feet high. The power obtained to be used to furnish Albion and intermediate villages with power, which will be transported by electricity.

New Manufacturing Companies.

NEW LONDON, CONN.—The New London Automatic Lighting Company; capital, $1,000. Incorporators, A. T. Hale, Frederick S. Gordon and Frank B. Brandegee.

DENVER, COLO.—The Standard Electric Company. Incorporators, H. A. Triggs, C. D. Ledger, A. F. Haberl and Wallace Brooks. The company will sell electrical appliances.

WINCHESTER, KY.—The McNeill-Snider Company, capital, $100,000, has been incorporated to erect electrical works. S. P. Kerr, president; J. H. Snider, secretary; S. Lansburg, treasurer, and William McNeill, electrician.

CHIPPEWA FALLS, WIS.—The Brooks Safety Truck Company; capital, $2,000,000. Incorporators, Philip Loewe, A. Brooks and T. J. Connors. The company will manufacture the Brooks patent car trucks.

Micanite.

Mica is a natural mineral—a silicate of several oxides. It is of great value as an insulator and dielectric. Prof. Ayrton gives its resistance per centimeter cube after several minutes' electrification at 20°C (68° F) as 84×10^{12}. Taking air as 1, its specific inductive capacity is 5. Mica occurs in sheets, and is readily subjected to cleavage. The plates, of various thicknesses, have many uses in the electrical arts. In cutting the plates to pattern sizes there is, of course, considerable waste. This waste mica is just as valuable as an insulator if it can be prepared in the proper form.

Micanite is a combination of pure India sheet mica and the least possible amount of cement of the highest resistance. It can be furnished in any desired form or size, and the compound readily lends itself to manipulation under mechanical processes, such as sawing, shearing, punching and boring. This valuable material was described in a paper recently read before the American Institute of Electrical Engineers by Mr. Edward P. Thompson. The title of the paper was "Micanite and Its Application to Armature Insulation," and it was published in full, with illustrations, in the ELECTRICAL REVIEW for December 21, 1892.

The subject of insulation, and especially that of armature insulation, is one of the most important in the electrical art, and we are glad to welcome a material which promises to be of such value as micanite. It is manufactured in any desired form by the Mica Insulation Company, of Schenectady, N. Y., for whom Eugene Munsell & Company, 218 Water street, New York, are sole agents.

FINANCIAL NEWS.

An attachment for $6,000 has been obtained against A. Bridgman & Company, manufacturers of electric medical specialties at 373 Broadway, New York, in favor of Lydia Bridgman.

"Rialto" in the Boston *Advertiser* says: "Now that the electric 'scoops' are over, it would seem about time for the pools to advance their favorites. Less talk and more work would help electric stocks materially."

The estimated net earnings of the West End Street Railway Company, of Boston, for the quarter ended with December are $542,000, an increase of $125,000. Interested parties predict a gain of $200,000 in the first quarter of 1893.

A. Elshoff & Company, dealing in electrical supplies, filed a deed of assignment in the recorder's office at New Albany, IND., on December 30, Judge G. B. Cardwill being selected as assignee. The liabilities are $1,100; the assets about $800.

The closing quotations of electric stocks on the Boston exchange, Saturday, January 7, were:

	Bid.	Asked.
Edison Electric Illuminating	185	140
General Electric	112	113¾
Westinghouse 1st pf	33½	34
Westinghouse assenting	47½	48½
United States Rubber	43½	43½
Fort Wayne Electric	128¾	134
Fort Wayne Electric (A)	7¾	8
Thomson-Houston Trust (D)	7¾	8
Thomson Eur. Electric Weld	?	—

KINDRED INTERESTS

The Fort Wayne Electric Company, Fort Wayne, Ind., recently shipped an 80 light arc dynamo to Detroit and a 400 incandescent light plant to Utica, N. Y.

The Bubier Publishing Company, Lynn, Mass., has sent us a very pretty souvenir calendar of the World's Fair with illustrations of the various buildings.

The Hotel Arragon, Atlanta, Ga., has been outfitted with a steam plant consisting of two 50 horse-power New York Safety Steam Power engines and General Electric Company's apparatus.

The Direct United States Cable Company, through the courtesy of Superintendent James Brown, has sent us a very handsome pad calendar, advertising the service of the company, which is prompt and reliable and conducted at cheap rates. The cables of this company are all worked on the duplex system.

The Scranton Traction Company, of Scranton, Penn., have placed the contract for the buildings of their new plant with the Berlin Iron Bridge Company, of East Berlin, Conn. The boiler and engine room will be 65 feet wide by 200 feet long, with a machine shop and car shed 93 feet wide by 225 feet long. The entire plant will be fire proof, of the well known Berlin construction.

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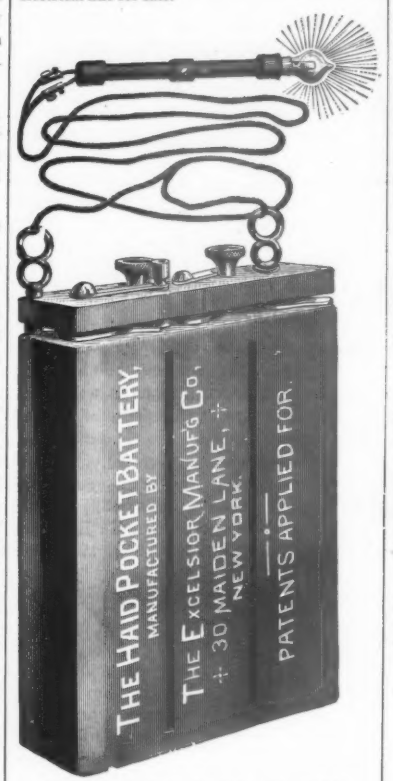

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